# TEXT-BOOK OF ORTHOPÆDIC MEDICINE

## TREATMENT BY MANIPULATION AND MASSAGE



# TEXT-BOOK OF ORTHOPÆDIC MEDICINE

## VOLUME II

## TREATMENT BY MANIPULATION AND DEEP MASSAGE

By

JAMES CYRIAX

M.D., B.Ch.(Cantab.)

Physician to the Department of Physical Medicine
St. Thomas's Hospital, London



CASSELL AND COMPANY LTD.

London, Toronto, Melbourne
Sydney and Wellington

1950

*First Impression* *November*, 1944
*Second Impression* . . *August*, 1945
*Second Edition* . . *August*, 1946
*Third Edition* . . . *July*, 1948
*Fourth Edition* . . *November*, 1950

(*Revised and recast as Vol. II of*
Textbook of Orthopædic Medicine)

PRINTED IN GREAT BRITAIN BY J. AND J. GRAY, EDINBURGH
F. 770

# PREFACE

WHEN massage is required for deep-seated tissues it must be given with penetrating effect. When joints have to be manipulated, great accuracy in technique is essential. These are the premises upon which the whole of this book rests, and a technique for affecting each of the structures of the body commonly requiring manual treatment is illustrated in its pages. Though there are often alternative methods, the pictures show those that have been found best suited to the majority of physiotherapists. No special difficulties have been encountered in teaching these techniques, which may therefore be held to lie well within the capacity of the average student. They should at least form a starting-point from which the physiotherapist can evolve the method that comes most easily to her own hands.

The illustrations and the descriptions appended to them are designed for the guidance of physiotherapists called upon to treat deeply situated lesions. I believe that the adoption of the methods described, which ensure that treatment shall reach the actual site of the lesion, will in due course dispel much of the present-day scepticism on the therapeutic power of manipulation and manual frictions. Not until all deeply placed lesions for which this treatment is desirable receive deeply penetrating massage as a matter of course will doctors in general become impressed by the curative value of massage. Not until all disorders relievable by manipulation of joints receive this treatment promptly and accurately will medical men prefer to send patients to physiotherapists rather than to bone-setters.

Superficial treatment, especially by means of heat or massage, over the whole site at which pain is felt is still practised; but thanks largely to our present understanding of pain and of the way in which it is referred from the actual site of the causative lesion, there are now very few who would regard such treatment as adequate. Now, too, that doctors can offer a precise diagnosis—*i.e.* can demonstrate exactly where lesions lie by using such methods as the induction of local anæsthesia—it is the duty of physiotherapists to administer equally precise treatment. I trust that these pictures, with the

instructions in details of technique that accompany them, will contribute to this end.

One word of warning is necessary. Before deep—and thus painful—massage is given, every care must be taken to ensure that it is concentrated on the right spot; before manipulation—an uncomfortable and, in the wrong type of case, dangerous procedure—can be confidently prescribed and its exact nature indicated, every care must be taken that the disorders suited and unsuited are competently sorted out. These subjects, which may well be named diagnosis with a view to physiotherapy, together with other matters are dealt with in my book *Rheumatism and Soft-Tissue Injuries**—a manual intended primarily for the medical profession, but one which physiotherapists interested in the theoretical and diagnostic side of their work should possess.

The wide recognition of the therapeutic value of exercises—a subject in which all physiotherapists are so well grounded during their training—contrasts with the comparative indifference so often shown towards manual friction and forced movements. This grave omission opens the way to successful treatment later by unqualified practitioners. However, if the methods illustrated in this book are employed with discrimination, I am certain that a great step forward will be made in the practice of manual methods and in the results obtained by physiotherapists.

My grateful thanks are due to Miss N. Harvey, for eleven years my physiotherapist, and to all the other physiotherapists who so obligingly posed for the photographs. I must also place on record my appreciation of the skill and infinite patience of Mr. Oliver Drury, the photographer.

* Cassells, 1947.

# PREFACE TO THE FOURTH EDITION

SOME changes that have been made in the form and title of this volume call for a few words of explanation. In 1944 I published a work entitled *Deep Massage and Manipulation Illustrated*, directed in the first place to physiotherapists; and in 1947 *Rheumatism and Soft-Tissue Injuries*, similarly directed to doctors. Inevitably these two works, concerned as they were with different aspects of the same subject, overlapped in many places, and I have long given thought to the problem of combining their substance in such a way as to avoid all unnecessary repetition.

The result is a new work in two volumes, under the title *A Textbook of Orthopædic Medicine*. Volume I., now in preparation, covers essentially the same ground as that of *Rheumatism and Soft-Tissue Injuries*. It is intended chiefly for the medical profession, and is concerned with the problems of diagnosis and with the details of such methods of treatment as cannot properly be administered by physiotherapists. Nevertheless, it is a volume to which physiotherapists interested in the theoretical basis of their work may well refer. Volume II., now published, is an amplification of the original *Deep Massage and Manipulation Illustrated*. It remains a work for the physiotherapist, dealing fully with the accurate technique of manual procedures that are now prescribed by an increasing number of doctors, and must therefore be brought within the competence of every physiotherapist. I am well aware, and deplore the fact, that no physiotherapist need acquire proficiency in these methods in order to pass the professional qualifying examinations, but this does not make them any the less necessary for the proper treatment of patients.

In this enlarged edition the theoretical aspect of precise manual methods has been considered at much greater length; furthermore, the principles underlying treatment by manipulation and massage are set out in detail. The indications for and against such methods have been included, together with a summary of the different ways in which rehabilitation is best achieved after soft-tissue injuries. Thus, in addition to descriptions and illustrations of how to carry out a number

of essential manœuvres, the physiotherapist is afforded an adequate view of the whys and wherefores of much of his or her daily work.

Physiotherapists who have mastered these methods are in a position to give accurate treatment for a number of common disorders difficult to affect in any other way. They have nothing to fear from the otherwise damaging competition of lay masseurs and manipulators. They know that they are employing direct methods, requiring skill and judgment, interesting to use and as gratifying to employ as, afterwards, rewarding to the patient.

JAMES CYRIAX.

## CONTENTS

of essential manœuvres, the physiotherapist is afforded an adequate view of the whys and wherefores of much of his or her daily work.

Physiotherapists who have mastered these methods are in a position to give accurate treatment for a number of common disorders difficult to affect in any other way. They have nothing to fear from the otherwise damaging competition of lay masseurs and manipulators. They know that they are employing direct methods, requiring skill and judgment, interesting to use and as gratifying to employ as, afterwards, rewarding to the patient.

JAMES CYRIAX.

# LIST OF ILLUSTRATIONS

TREATMENT OF VARICOSE ULCERS

TREATMENT OF VARICOSE ULCERS

PART ONE

# PRINCIPLES AND TECHNIQUE OF MANIPULATION AND DEEP MASSAGE

# CHAPTER I

## THEORY AND PRACTICE OF MASSAGE

MASSAGE is given in many ways for many purposes. This book is concerned only with those manual techniques—frictional and manipulative—that affect deep-seated structures. These have been chosen for illustration because the effect of their use depends so largely on the precision of the technique employed. When there exist many techniques, good, bad and indifferent, it is inevitable that there should also be discrepancies in the results of treatment, and that these discrepancies should lead to doubts as to the value of the treatment in any circumstances. It has, therefore, seemed worth while to put forward tentatively a standard massage and manipulative technique in the assurance that it will achieve consistent results, and in the hope that it may eventually lead to general agreement on the indications for, and technique of, the methods concerned.

### TYPES OF MANUAL TREATMENT

**1. Deep Effleurage.**

This technique serves to relieve congestion. Swelling is treated in many situations by upward stroking of sufficient depth to remove it. The chief indications for effleurage are œdema and traumatic periostitis. Such conditions as puerperal congestion of the breast also respond well.

*Œdema*

Whether the œdema appears as the result of an injury, of the removal of a plaster cast from the lower limb, of venous thrombosis or is of the type known as angio-neurotic, effleurage is usually indicated for its diminution or removal. A crêpe bandage should be applied tightly at the end of each session and kept on until the next session. The massage should be given daily, sometimes more often. In the treatment of œdema due to heart-failure, phlebitis, nephritis, or lymphatic

obstruction caused by carcinomatous invasion, massage is only a temporary palliative. The œdema about an infected area must not be treated by massage ; and hereditary œdema of the leg (Milroy's disease) and œdema due to filaria (elephantiasis) are not benefited. The œdema that always occurs after an amputation, especially at the lower limb, should be treated not by massage but by continuous pressure bandaging, tightened several times a day.

*Traumatic Periostitis*

Since the periosteum is attached to a motionless structure —bone—the formation of adherent scars is harmless. Deep friction is, therefore, never required. The periosteum is painful because it is swollen, and no more need be done than to reduce the swelling by firm, but not painful, deep effleurage, given daily. If a subperiosteal hæmatoma is present, aspiration will much hasten the patient's recovery, since blood is absorbed very slowly thence.

**2. Combined Squeezing and Stroking.**

When the evacuation of pus and granular sequestra from some types of chronic septic sinus is to be hastened, this technique is required. The massage starts at the site of the lesion and is carried towards the opening of the sinus. A daily session is called for.

**3. Clapping and Shaking.**

Mucus and muco-purulent material can be dislodged from the bronchi and trachea by this means. Clapping and allied movements may thus be employed to assist drainage of bronchiectatic cavities while the appropriate posture is held. By shaking it for twenty minutes I once apparently succeeded in dislodging a piece of adherent mucus from the trachea of a singer just before a concert, thus relieving a hoarseness that would otherwise have prevented his appearance.

**4. Kneading, Picking Up, etc.**

This type of massage is used in an endeavour to assist the maintenance of power and range in muscles, near the seat of

an injury, deprived of their nerve-supply or during immobilization.

Strictly speaking, a good deal of this sort of massage is given unnecessarily, since it is often applied to normal structures requiring only active use for the continuance of their normality. But the absorption of effused blood may be hastened and a muscle kept supple and prevented from forming unwanted adherences by this sort of massage, and the nutrition of a limb with extensive paralysis may be assisted; hence it forms a valuable massage technique in spite of the frequency with which it is employed without discrimination.

Kneading is said to be a good preventive of the painful muscular cramps suffered by some athletes. It has also been recommended for diminishing the sensitivity of painful amputation stumps.

### 5. Deep Friction.

The most potent form of massage is deep friction. By this means, and by this means alone, massage can reach to structures far below the surface of the body. Since the source of pain in patients for whom manual methods are required so often lies in muscle, tendon, ligament, joint-capsule or fascia, whether as the result of injury or repeated strain, a penetrating technique is often required and is clearly essential if such tissues are to be affected. It is thus vital to every physiotherapist faced with the treatment of a variety of common disorders that she should be fully acquainted with this—the most remedial—type of massage.

When mobility is to be maintained at, or restored to, those moving parts which from their nature or position are apt to develop adhesions, deep friction is often the method of choice, either alone (as in the case of tendons) or in association with passive movements (for some ligamentous lesions) or with active movements (for minor muscular ruptures). An important part of a physiotherapist's knowledge consists in choosing and applying whichever type of therapeutic movement is best adapted to the patient's disorder.

### 6. Friction for Ulcers.

The treatment of varicose ulcers by deep centripetal friction applied to the intact skin at the edge of the ulcer was introduced by Bisgaard and has proved most successful.

**7. Manual Vibrations.**

These encourage relaxation of the unstriated musculature of the *intestine*.

**8. Pleasant Treatments.**

Convalescent or neurasthenic patients, insomniacs and those who prefer to take their exercise vicariously may be ordered such treatment. Since the comfort and satisfaction that the patient derives are the sole criterion for judging the adequacy of treatment, the physiotherapist should give a soothing or stimulating treatment according to the patient's needs and mood. From the medical point of view this is the *least necessary part of the physiotherapist's work; from her* point of view the most boring. Some patients of this type have had treatment from many physiotherapists and may be critical even to the point of captiousness; hence the possession of a good pair of hands and an engaging personality are most important assets in this kind of work . . . and it is *hard* work. In practice doctors do not prescribe a general treatment very often; it is rather the patient who asks for it, the doctor merely acquiescing.

**9. Pinching.**

Fat in the subcutaneous tissues lies within a capsule. If this is ruptured, the fat exudes and gets absorbed in exactly the same way as the mucin in a ganglion that has been burst. If patients really wish to be made thinner by a physiotherapist, the most merciless pinching is required. Ordinary massage or deep friction is quite useless.

**10. Percussion.**

Neuromata may give rise to tender amputation-stumps or painful phantom limbs. It has recently been shown that repeated percussion, if necessary by means of a wooden applicator and a mallet, may abolish the symptoms, often lastingly.

## DEEP MASSAGE

The philosopher who sits in an armchair and considers the question of deep massage in the treatment of painful lesions is

driven by apparent logic to the conclusion that it is never called for at all. Clearly, he says to himself, if a structure is already inflamed, massage given with penetrating effect can only irritate it the more. Alternatively, massage so administered that it does not reach the lesion is obviously valueless. The bane of mediæval times lay in the fact that it was not considered necessary to subject ideas to experimental proof. This one-time orthodoxy has grown out of date and more reliance is nowadays placed on the results of controlled trial than of abstract thought alone. It follows that the matter put forward in this chapter should be discarded or accepted according to the results achieved when the recommendations are put into actual practice rather than subjected to criticism based only on *a priori* reasoning or on the fact that it conflicts with the present-day vogue for rehabilitation by the patient's endeavours alone.

The essential fact about deep friction is as follows: It supplies therapeutic movement over only a very small area. The movement is the more effective for being so concentrated. Indeed, greater movement may easily be imparted locally by the physiotherapist's finger than could ever have been obtained by any amount of the most strenuous exercises. On account of its purely local action, deep friction must be applied to the exact site of the lesion; otherwise it is useless. Indeed, it is harmful, in so far as it hurts the patient without bringing him any eventual benefit.

## MODE OF ACTION OF DEEP MASSAGE

A penetrating technique is required in the treatment by massage of deep-seated lesions. Given properly, deep friction has a dual effect. It induces (1) traumatic hyperæmia, (2) movement.

### 1. Hyperæmia.

Enhancing the blood supply diminishes pain. Apparently it acts by increasing the speed of destruction of Lewis's P-factor, the substance responsible for the pain. Heat and counter-irritants soothe for the duration of their application,

also as the result of a similar enhancement of blood-flow. They seldom have a lasting effect upon the type of lesion under discussion, because no other change than the circulatory seems to be secured. Deep massage results in a more lasting hyperæmia and it appears to be in this way that the friction, though in itself painful, is found at the end of the session to have allayed the symptoms.

**2. Movement.**

By moving the painful structure to and fro, this is freed from adhesions both actually present and in the process of formation. Clearly massage applied parallel to the length of a structure follows the course of the blood and lymph vessels, whereas a transverse friction does not. Hence longitudinal frictions do more to obviate stagnation of blood and lymph than transverse. Thus it is evidently not by its effect on the general circulation within that tissue or on the lymph flow that deep transverse friction achieves its results, though this explains the immediate analgesic action. I regard the lasting benefit that so often follows massage in muscular, tendinous and ligamentous lesions as caused by the application of therapeutic movement to the affected part. This explains the curious phenomenon that, as soon as the session ends, the patient's pain is left partly relieved, the structure hurting less when required to function but for some time remaining more tender to the touch.

## DEEP MASSAGE IN TREATMENT OF MUSCULAR LESIONS

The main function of muscle is to contract. As it does so it broadens. Hence full mobility in broadening out must be maintained or restored in muscles that have been the seat of inflammation—whether caused by one or by repeated strains. Resolution by fibrosis is occurring or has already occurred. The effect of deep transverse friction clearly consists in mobilizing the muscle, *i.e.* separating the adhesions between individual muscle fibres that are restricting movement. If passive restoration of full mobility of a muscle is followed by

adequate active use, these adhesions do not re-form; cure results.

The principle governing the treatment of muscles during the acute or chronic stage is the same. The endeavour must be to prevent the continued adherence of unwanted young fibrous tissue in recent cases, or to rupture adherent scar-tissue in long-standing cases. To stretch out a muscle does not widen the distance between its fibres; on the contrary, during stretching they lie more closely. Whereas, then, for the rupture of adherent scars about a joint mobilization is required, interfibrillary adhesions in muscle can be broken, not by stretching, but by forcibly broadening the muscle out. Particularly is this true of the fibres of attachment of muscle into bone, where the rupture of adhesions is possible only by means of friction or subcutaneous division. Thus, *deep transverse frictions restore mobility to muscle in the same way as mobilization frees a joint.* Indeed, *the action of deep transverse frictions may be summed up as affording a mobilization such as passive stretching or active exercise cannot achieve.*

## DEEP MASSAGE IN TREATMENT OF LIGAMENTS

*In recent cases,* after any œdema that may be present has been removed by effleurage, the site of the minor tear in the ligament should receive some minutes' friction. The purpose is to disperse blood-clot or effusion here, to move the ligament to and fro over subjacent bone (thus maintaining its mobility) and to numb it enough to facilitate movement afterwards. The least strength of friction that achieves these results is called for. Passive then active movements follow. After a short time, the effleurage becomes less necessary and more attention is devoted to the friction and to exercising the injured limb under supervision. In the case of the lower limb instruction in gait follows.

*In chronic cases* deep friction is given to fibrous structures such as ligaments in preparation for mobilization. In such cases the friction thins out the scar-tissue by which the fibrous structure is held abnormally adherent, and so numbs it that mobilization becomes possible.

also as the result of a similar enhancement of blood-flow. They seldom have a lasting effect upon the type of lesion under discussion, because no other change than the circulatory seems to be secured. Deep massage results in a more lasting hyperæmia and it appears to be in this way that the friction, though in itself painful, is found at the end of the session to have allayed the symptoms.

**2. Movement.**

By moving the painful structure to and fro, this is freed from adhesions both actually present and in the process of formation. Clearly massage applied parallel to the length of a structure follows the course of the blood and lymph vessels, whereas a transverse friction does not. Hence longitudinal frictions do more to obviate stagnation of blood and lymph than transverse. Thus it is evidently not by its effect on the general circulation within that tissue or on the lymph flow that deep transverse friction achieves its results, though this explains the immediate analgesic action. I regard the lasting benefit that so often follows massage in muscular, tendinous and ligamentous lesions as caused by the application of therapeutic movement to the affected part. This explains the curious phenomenon that, as soon as the session ends, the patient's pain is left partly relieved, the structure hurting less when required to function but for some time remaining more tender to the touch.

## DEEP MASSAGE IN TREATMENT OF MUSCULAR LESIONS

The main function of muscle is to contract. As it does so it broadens. Hence full mobility in broadening out must be maintained or restored in muscles that have been the seat of inflammation—whether caused by one or by repeated strains. Resolution by fibrosis is occurring or has already occurred. The effect of deep transverse friction clearly consists in mobilizing the muscle, *i.e.* separating the adhesions between individual muscle fibres that are restricting movement. If passive restoration of full mobility of a muscle is followed by

## CHAPTER II

## TECHNIQUE OF DEEP FRICTION

When massage is to be given to muscle, tendon, ligament, fascia or joint-capsule, two principles must be observed. They are that the massage must be given (a) to the right spot, and (b) in the most effective way. Clearly, only the place whence a pain springs requires treatment, but the referred pain so often present in the conditions sent to a Physiotherapy Department creates immediate difficulty; for the site of the pain and even of the tenderness do not then correspond with the site of the lesion. Since deep massage applies therapeutic movement only locally, it is by no means enough merely to apply friction somewhere close to a lesion. To give massage to a normal structure only a fraction of an inch away from the correct spot, is, in my view, quite valueless. There are many conditions unsuited to treatment by deep massage; these should not receive it. There exist other disorders calling for friction; this must then be given to the exact spot whence the pain originates, but it must be remembered that this does not necessarily lie within the area in which the patient *feels* the pain.

Once agreement has been reached on the truism that the actual site of the lesion alone requires treatment, the question naturally arises of how a penetrating effect is best imparted to massage. The principles are:

### 1. The physiotherapist's fingers and the patient's skin must move as one.

Should movement take place between the patient's skin and the physiotherapist's fingers, then the friction is expended on the patient's skin. When penetration is required, this can be secured only by rubbing the patient's skin and subcutaneous fascia against his muscle, ligament or tendon. The whole art of giving deep friction without damaging the patient's skin depends on mastery of this technique. Vigorous friction between the physiotherapist's finger and the patient's skin soon raises a blister. When, on the other hand, the skin and superficial tissues are drawn to and fro over the area to be treated,

## DEEP MASSAGE IN TREATMENT OF TENDONS

In acute and chronic teno-vaginitis the way deep massage acts appears somewhat different. On logical grounds it has been widely held that teno-vaginitis, being as a rule the result of overuse, should not be treated by further friction. Nevertheless this is the very condition in which massage achieves some of its quickest and most brilliant results. The phenomenon of crepitus proves that roughening of the gliding surfaces occurs. The fact that slitting up the sheath of the tendon at open operation is immediately curative shows that it was the movement between the close-fitting sheath and the tendon that set up the pain. Hence it would appear that manual rolling of the tendon-sheath to and fro against the tendon serves to smooth the gliding surfaces off again. While the causative trauma was longitudinal friction the curative is transverse.

In those tendons that lack a sheath the way deep massage acts is not so clear. After minor teno-periosteal tears the movement imparted by the massage, when successful, presumably breaks up scarring at the insertion of tendon into bone. When the substance of a tendon such as the supraspinatus is affected, it is difficult to understand exactly what the massage can do unless it is assumed that scar-tissue lies here and is capable of mobilization manually. Since no sheath exists, there is no reason to suppose that some slight roughening of the surface of the tendon would cause symptoms. Nevertheless, deep friction provides the only method known to me of bringing lasting relief quickly in such cases.

that adequate massage to an inflamed, and therefore tender, spot is bound to be painful, the fact that massage is painful is no guarantee that it is correctly given. *Unless the friction is given with a sufficient transverse sweep its curative value is largely lost.*

**4. The friction must reach deeply enough.**

The vigour with which deep massage is given is proportional to the toughness and distance from the surface of the tissue at fault. When, for example, the thick tendons at the shoulder require treatment, the limiting factor is the physiotherapist's strength. She cannot rub hard enough to do harm; her difficulty is to rub hard enough to do good.

The frictional element in deep massage is always paramount; pressure augments, but must never replace, friction. If this essential point is neglected a most painful treatment results which has no curative value. Hence, while proper massage to a tender area is bound to hurt, the mere fact of hurting affords no proof that the technique is correct. Indeed, deep friction, skilfully given, hurts less than when given by a novice. During each session physiotherapists unaccustomed to this sort of work do better to give a friction that really reaches the lesion for a few minutes at a time, pausing betweenwhiles, than to rub gently, and hence in vain, for a longer period.

**5. The patient must adopt a suitable position.**

A position must be adopted that ensures the requisite degree of tension on, or relaxation of, the tissue to be treated. Some structures, notably the tendons about the shoulder, lie out of reach of a physiotherapist's finger unless the patient is first put into the position dictated by anatomical considerations.

**6. Muscles must be kept relaxed while being given friction.**

When, as is common, the substance of a muscle rather than its surface is affected, the massage must penetrate deeply. Hence the patient must keep his muscle relaxed throughout the administration of the massage. Since his instinct is to steel himself against the discomfort of the friction by contracting his muscle, he has to learn to avoid this reaction.

they stand the strain perfectly well. Some transient redness *of the skin usually follows, but no more. Occasionally, in fat* patients, a little subcutaneous bruising may appear a day or two after the massage; rarely a nodule may form in the adipose layer. The patient is usually quite unconscious of either, and both soon disappear. Sometimes it may be advisable to alter the area of skin receiving pressure from time to time during one session. The finger may be applied to the lesion after the skin has been drawn to one or other side. When the choice has to be made, it is always preferable to be sure of reaching the right spot than to spare the patient some hours' soreness of his skin. The doctor must back the physiotherapist up should a patient complain; he has only to point out that deep massage to a tender point cannot be painless for *the patient to understand the position.*

**2. The friction must be given *across* the fibres composing the affected structure.**

Striated structures must receive massage given transversely. It is only thus that each fibre is drawn away from its fellow and mobility restored to muscle; it is thus that a ligament is made to reproduce its normal movement over bone; and it is thus that the surface of a tendon may be smoothed off. The thicker and stronger the structure, the more must friction be given to it strictly across the grain.

**3. The friction must be given with sufficient sweep.**

The amplitude of the to-and-fro movement of the physiotherapist's fingers must be great enough to ensure that the *frictional element is paramount. Only thus can effective* separation of each fibre from its fellow be secured. The limiting factors are only the size of the area requiring treatment and the elasticity of the overlying skin. In this connexion it is unfortunate that students are often taught to impart deep friction by a circular movement of the thumbs. When this method is used for deeply situated lesions no physiotherapist —however strong her hands—can avoid giving what amounts to pressure without enough friction. This should be avoided as it is painful and seldom curative.

It is a grave fault when, in giving massage, pressure replaces, instead of augmenting, friction. Thus, while it is true

that adequate massage to an inflamed, and therefore tender, spot is bound to be painful, the fact that massage is painful is no guarantee that it is correctly given. *Unless the friction is given with a sufficient transverse sweep its curative value is largely lost.*

**4. The friction must reach deeply enough.**

The vigour with which deep massage is given is proportional to the toughness and distance from the surface of the tissue at fault. When, for example, the thick tendons at the shoulder require treatment, the limiting factor is the physiotherapist's strength. She cannot rub hard enough to do harm; her difficulty is to rub hard enough to do good.

The frictional element in deep massage is always paramount; pressure augments, but must never replace, friction. If this essential point is neglected a most painful treatment results which has no curative value. Hence, while proper massage to a tender area is bound to hurt, the mere fact of hurting affords no proof that the technique is correct. Indeed, deep friction, skilfully given, hurts less than when given by a novice. During each session physiotherapists unaccustomed to this sort of work do better to give a friction that really reaches the lesion for a few minutes at a time, pausing betweenwhiles, than to rub gently, and hence in vain, for a longer period.

**5. The patient must adopt a suitable position.**

A position must be adopted that ensures the requisite degree of tension on, or relaxation of, the tissue to be treated. Some structures, notably the tendons about the shoulder, lie out of reach of a physiotherapist's finger unless the patient is first put into the position dictated by anatomical considerations.

**6. Muscles must be kept relaxed while being given friction.**

When, as is common, the substance of a muscle rather than its surface is affected, the massage must penetrate deeply. Hence the patient must keep his muscle relaxed throughout the administration of the massage. Since his instinct is to steel himself against the discomfort of the friction by contracting his muscle, he has to learn to avoid this reaction.

Moreover, he must be placed in a position in which the part controlled by that muscle lies limply.

**7. Tendons with a sheath must be kept taut while being given friction.**

In teno-vaginitis the inflammation is confined to the outer surface of the tendon and the inner surface of its sheath. The friction is intended to smooth off the two gliding surfaces. To this end the tendon must be stretched so that it forms an immobile basis against which to move the sheath. Should the tendon remain lax, it and its sheath are rolled against adjacent structures and little good results.

## CAUSES OF FAILURE OF TREATMENT

The two common causes for failure to bring relief by massage in conditions known to respond to it well are: (1) failure to find the right spot, (2) improper technique. The failure to find the right spot may lie with the physician, who cannot avoid occasionally making a diagnostic error. Or it may rest with the physiotherapist who, though told where the lesion is situated, may treat the wrong place. Or she may be treating the right place in the wrong way.

When a patient fails to improve, therefore, the first essential is to examine him all over again. Any doubts on the diagnosis that still exist should be resolved, whenever possible, by the use of local anæsthesia. All this should be done in the presence of the physiotherapist, so that she may be a party to the diagnosis; for on her conviction that she is being asked to treat the right spot depends a good deal of the depth of her friction. Naturally, she can put her heart into her work only when she shares the doctor's certainty. Should the diagnosis prove to have been correct, the next likelihood is that the massage is imperfectly given, in situation, or depth or direction. The physiotherapist is asked to show how and where she has been giving the massage and any faults in her technique or in the position of the patient corrected. If the diagnosis and the physiotherapist's technique have both proved correct and an adequate number of sessions has been given, treatment by massage should be abandoned.

## POSITION OF PHYSIOTHERAPIST AND HER HANDS

The physiotherapist's best position for nearly all deep massage is to be seated by a low couch; her hands and forearms can then remain horizontal as she leans forward until her body-weight is almost above the area receiving treatment. She should place her hands in such a way that they rest naturally on the patient, ensuring that the movement about to take place shall be natural too. She should then adjust the position of her body so as to bring her upper limb into line with her hands.

If much deep friction is to be given in the course of a day, it is essential to use the hands alternately, and to use now the fingers, now the thumb, for affecting the same place. Full ambidexterity is most useful. When part of a limb is to be treated, the physiotherapist's hand is as a rule best used in a grasping position.

The ability to continue friction for a considerable time is increased by sharing the work out among different muscles of the physiotherapist's limb. For example, if the finger or thumb is held firmly against the structure to be treated, and the friction is induced by a wrist, elbow, shoulder or trunk movement, two sets of muscles are in action and more power is achieved for less effort. No matter how strong the physiotherapist, she cannot give effective friction by alternate flexion and extension movements of the fingers or thumb. *The whole hand must move.* Massage must not be given with the fingers hyperextended, for the capsules of the interphalangeal joints soon become painfully strained. The fingers should be kept slightly flexed during heavy massage, and the necessary strength of the forearm muscles acquired. It should not be necessary to add that when the hand is used in this position the finger-nails must be kept quite short.

### Suitable Positions of the Physiotherapist's Hands

There are four main ways in which a physiotherapist may use her hand to the best advantage. They are:

Moreover, he must be placed in a position in which the part controlled by that muscle lies limply.

**7. Tendons with a sheath must be kept taut while being given friction.**

In teno-vaginitis the inflammation is confined to the outer surface of the tendon and the inner surface of its sheath. The friction is intended to smooth off the two gliding surfaces. To this end the tendon must be stretched so that it forms an immobile basis against which to move the sheath. Should the tendon remain lax, it and its sheath are rolled against adjacent structures and little good results.

## CAUSES OF FAILURE OF TREATMENT

The two common causes for failure to bring relief by massage in conditions known to respond to it well are: (1) failure to find the right spot, (2) improper technique. The failure to find the right spot may lie with the physician, who cannot avoid occasionally making a diagnostic error. Or it may rest with the physiotherapist who, though told where the lesion is situated, may treat the wrong place. Or she may be treating the right place in the wrong way.

When a patient fails to improve, therefore, the first essential is to examine him all over again. Any doubts on the diagnosis that still exist should be resolved, whenever possible, by the use of local anæsthesia. All this should be done in the presence of the physiotherapist, so that she may be a party to the diagnosis; for on her conviction that she is being asked to treat the right spot depends a good deal of the depth of her friction. Naturally, she can put her heart into her work only when she shares the doctor's certainty. Should the diagnosis prove to have been correct, the next likelihood is that the massage is imperfectly given, in situation, or depth or direction. The physiotherapist is asked to show how and where she has been giving the massage and any faults in her technique or in the position of the patient corrected. If the diagnosis and the physiotherapist's technique have both proved correct and an adequate number of sessions has been given, treatment by massage should be abandoned.

Deep friction, however, can seldom be given more often than every other day, for the spot is too tender the next day to permit adequate treatment. The strength of the massage must not be abated if tenderness persists, but the interval between sessions should be prolonged. The proper moment *to give the next treatment is when excess of tenderness has* worn off, no matter how long this may take. The interval is usually from two to seven days. Patients should not be given a "course" of so many treatments. They should be treated either until well or until no further improvement is possible. Alternatively, the method may be found useless after adequate trial; it should then be abandoned. It should be borne in mind that local tenderness due to deep friction often persists long after disappearance of pain due to the lesion. These symptoms—tenderness and pain—must be clearly distinguished, *and treatment must cease as soon as the pain has been relieved, irrespective of the persistence of tenderness.*

**Number of Patients treated Daily.**

To do her work properly the physiotherapist must not be rushed. Clinics exist at which thirty, forty, even fifty patients are treated during a seven-hour day. This implies giving less than a quarter of an hour's attention to each patient. Individual treatment cannot then fail to degenerate at best into fifteen minutes' heat, ten minutes' massage and some minutes' exercises; alternatively the patient may attend for class-work of dubious advantage to him. Few indeed among the conditions commonly dealt with in a physiotherapy department yield to such "treatment," though the patient may feel a short period of relief after each session. Departments that practise this form of "physiotherapy" defeat their own ends, for they lose—not save—time.

The fact is that in the long run patients are relieved much more quickly when clear instructions are given and the physiotherapist has enough time to implement them properly. The period allotted for each case must be *sufficient not only* for giving an adequate amount of manual treatment, followed when necessary by the appropriate exercises unhurriedly performed, but also for allowing the physiotherapist time to draw breath and collect herself, put the patient into the right posture, find the exact spot, and arrange her own position

1. *The Index crossed over the Middle Finger*

(Occasionally one thumb may be used instead of the crossed fingers.) This technique is well suited to linear areas, such as the attachment of a ribbon of tissue to bone: for example, the occipital insertion of the trapezius or the fibular origin of the lateral ligament of the ankle. This is also the best way to affect a supraspinous ligament or the coronary ligament at the knee. This position of the fingers is also required when massage is given to a structure ensconced between two bones, e g. the tendon of the tibialis posterior. One finger should be pressed on to the lesion and the friction imparted by rolling the finger to and fro over it. This movement is set up by alternating rotations of the forearm.

2. *The Middle Finger crossed over Index*

When a structure forming part of a limb is to be treated, the physiotherapist naturally grasps the limb, thus using her thumb for counter-pressure. The fact of curving the fingers means that the index no longer reaches to the distal phalanx of the middle finger; hence the tip of the middle finger should reinforce the index on the nail.

3. *Two Finger-tips*

Depending on how the fibres of the structure to be massaged run in relation to the physiotherapist's hand, the index and middle finger-tips, or the middle and ring finger-tips, should be used. The belly of any flat muscle can be suitably dealt with in this way.

4. *The Opposed Fingers and Thumb*

This is the pinching position. The physiotherapist, having grasped the structure, applies friction by pulling her hand towards herself. The edge of the latissimus dorsi muscle, the biceps brachii muscle, and the tendo Achillis provide instances of this usage.

## THE PHYSIOTHERAPIST'S WORKING DAY

**Interval between Sessions.**

Gentle massage, especially for the treatment of œdema or of a recent injury, is best given daily, sometimes more often.

Deep friction, however, can seldom be given more often than every other day, for the spot is too tender the next day to permit adequate treatment. The strength of the massage must not be abated if tenderness persists, but the interval between sessions should be prolonged. The proper moment to give the next treatment is when excess of tenderness has worn off, no matter how long this may take. The interval is usually from two to seven days. Patients should not be given a "course" of so many treatments. They should be treated either until well or until no further improvement is possible. Alternatively, the method may be found useless after adequate trial; it should then be abandoned. It should be borne in mind that local tenderness due to deep friction often persists long after disappearance of pain due to the lesion. These symptoms—tenderness and pain—must be clearly distinguished, *and treatment must cease as soon as the pain has been relieved, irrespective of the persistence of tenderness.*

**Number of Patients treated Daily.**

To do her work properly the physiotherapist must not be rushed. Clinics exist at which thirty, forty, even fifty patients are treated during a seven-hour day. This implies giving less than a quarter of an hour's attention to each patient. Individual treatment cannot then fail to degenerate at best into fifteen minutes' heat, ten minutes' massage and some minutes' exercises; alternatively the patient may attend for class-work of dubious advantage to him. Few indeed among the conditions commonly dealt with in a physiotherapy department yield to such "treatment," though the patient may feel a short period of relief after each session. Departments that practise this form of "physiotherapy" defeat their own ends, for they lose—not save—time.

The fact is that in the long run patients are relieved much more quickly when clear instructions are given and the physiotherapist has enough time to implement them properly. The period allotted for each case must be sufficient not only for giving an adequate amount of manual treatment, followed when necessary by the appropriate exercises unhurriedly performed, but also for allowing the physiotherapist time to draw breath and collect herself, put the patient into the right posture, find the exact spot, and arrange her own position

satisfactorily. Time thus spent is essential to the performance of good work. Striking results can be obtained by cutting down the number of patients treated daily until every physiotherapist has as much time as she wishes for each. Although a lesser number of daily treatments is given, this decrease becomes more than counter-balanced by the number of patients it is then possible to discharge.

At a mixed clinic the very most that a physiotherapist can be expected to deal with properly is twenty patients a day. If, as is quite usual, a considerable proportion suffers from lesions calling for deep massage or strenuous manipulations, somewhat fewer than this, say sixteen, is desirable. No physiotherapist, however strong and willing, can give manual treatment all day long; hence patients should be so spaced that two heavy cases do not follow each other. It goes without saying that a patient should always be treated by the same physiotherapist at each attendance.

## CHAPTER III

# INDICATIONS FOR AND AGAINST DEEP MASSAGE

## INDICATIONS FOR DEEP FRICTION

### 1. Muscular Lesions.

When the affected fibres lie in the belly of a muscle, deep friction followed by exercises forms the essence of the treatment.

When muscle has suffered recent trauma, the friction is given immediately—unless local anæsthesia is used—and is designed to prevent scar-tissue from becoming abnormally adherent, without interfering with those fibres consolidating themselves at the healing breach. The massage must reach the right spot but need not go on for long or be unduly vigorous. It must always be followed by *active* movements in every direction of the injured part; both passive and resisted movements are equally out of place.

For the late effects of muscular injuries the scarring must be broken up and the elasticity of the muscle restored. This requires the deepest type of massage. Exercises may help a little, but adequate friction is often effective when used by itself. Months of rehabilitation by exercises alone may achieve less than a few weeks' really adequate friction.

It is widely held that massage is useful for combating muscular spasm and wasting, but I do not share this view.

### 2. Lesions of Tendons, with and without a Sheath.

Inflammation of a long tendon possessing a sheath is called teno-vaginitis (teno-synovitis). Apart from such operations as slitting up the sheath, the correct treatment is always deep massage. Since the condition is usually due to over-use and maintained by use, movements of any sort merely repeat the causative trauma. Hence exercises, and any activity that sets up pain, must be avoided. Better results are consistently obtainable with friction than with the orthodox treatment by immobilization and heat, which is more cumbersome, much less certain, and takes far longer even when it does prove effective. Deep massage is given whether the condition is

acute or chronic, and whether complicated or not by effusion or crepitus.

In bacterial teno-vaginitis (*e.g.* compound palmar ganglion) massage is, of course, harmful. Rheumatoid teno-vaginitis may affect the tendon-sheaths at the wrist; nodules may form on the tendons in the palm as a complication of advanced rheumatoid arthritis. Neither causes much in the way of symptoms or is susceptible to treatment by physiotherapy of any sort.

Lesions of a short tendon without a sheath, *i.e.* tendinitis, may occur at the teno-periosteal junction or, less often, within the substance of the tendon. The response to massage is nearly always excellent.

### 3. Ligamentous Lesions.

During the first twenty-four hours local *anæsthesia* is the treatment of choice.

If more than a day has elapsed since the injury, part of the treatment of such ligaments as lie within fingers' reach consists in applying movement to them by deep massage. In recent cases the friction eases pain and moves the ligament to and fro over bone in therapeutic imitation of its normal behaviour. The maintenance of mobility at a damaged ligament has its most spectacular results at the knee, where traumatic arthritis is often severe enough to preclude any other method. Marked benefit also follows its employment in recent sprains of the tarsus. In these recent cases the friction need not last long or be very vigorous, since the fibroblasts are young and only very weakly attached. Afterwards, movement at the sprained joint must be gently increased passively: the same movements are then repeated actively. In the case of the lower limb instruction in gait follows. Patients treated by friction to the point of a minor ligamentous rupture, followed by movements, get well very much more quickly than those treated by diffuse massage and the same movements. The existence of bruising forms no bar to the immediate employment of massage; this will not cause recurrence of the hæmorrhage.

Chronic ligamentous sprain results from scars holding the ligament abnormally adherent to underlying bone. These must be ruptured by forced movement. This may be carried

out under general or local anæsthesia or under massage analgesia. The virtue in massage to the site of a chronic ligamentous sprain is the movement imparted to the ligament and the consequent thinning out and disengagement of these adhesions. The numbing effect also comes into play and makes fractional mobilization practicable through a larger range than would otherwise have been possible. Deep massage achieves some of its most dramatic results in this type of case.

**4. Capsular Contracture.**

The response to massage varies according to the size of the joint and the type and stage of the articular lesion.

Manual friction is powerless to effect the capsule of the large joints; for the structure is too thick and tough. It is, therefore, only at the small joints that deep massage need be considered in treatment. Traumatic, and to a lesser extent osteo-arthritic lesions at the acromio-clavicular, carpal, interphalangeal and tarsal joints may respond well. Deep massage is useless or harmful in rheumatoid arthritis.

**5. Subdeltoid Bursitis.**

In the earliest stage of traumatic subdeltoid bursitis not very deep massage is often effective in improving the range of movement. Thickening of the bursal wall or an effusion contra-indicates massage. Again, in the latest stage, when adhesions from a past adhesive bursitis require disengagement, friction once more becomes useful, though forcing movement under local anæsthesia is to be preferred. This appears to be the only example of bursitis ameliorated by massage.

## CONTRA-INDICATIONS TO DEEP FRICTION

Massage should not be given in the treatment of the following conditions. (By "massage" is meant such friction as actually reaches the structure named. Except in bacterial infection, gentle massage, being without effect on deep-seated lesions, is neither called for nor to be avoided.) Massage should not be attempted, of course, when the structure at fault is clearly beyond the reach of the physiotherapist's finger. For example, no useful purpose is served when a patient with osteo-arthritis

of the hip-joint receives massage, whether gentle or deep, to his gluteal muscles. This is merely where the pain is felt, not where its source lies. In such a case friction is not so much contra-indicated as a waste of effort, for no part of the capsule of the hip joint can be reached by the fingers.

**1. Inflammation due to Bacterial Action.**

No medical man would send such a case to a physiotherapist with a request for *active* treatment. Short-wave diathermy, which heats the part and thus increases the blood-flow through the inflamed tissue, or ionization with bacteriostatic drugs, provides the only effective physiotherapeutic measure, when the lesion lies deeply. For superficial sepsis ultra-violet light may be required.

**2. Traumatic Arthritis of the Elbow-joint.**

The proper treatment of an injury at the elbow which presents signs of an acute traumatic arthritis of that joint or in which there is pain on stretching of the brachialis muscle is rest in flexion. Massage and, more particularly, efforts passively to increase the range of extension at the elbow are useless; moreover, they carry the risk of provoking myositis ossificans. This is a grave complication, which should be treated in the first place by prolonged rest in flexion.

**3. Ossification in Soft Structures.**

Extensive ossification of a ligament contra-indicates all active treatment, but the tiny areas of calcification that occur in ligament, tendon or capsule some time after a severe sprain may be ignored. At the knee ossification in the tibial collateral ligament is rare and known as Stieda-Pelegrini's disease. The remote possibility of its occurrence should never be regarded as a contra-indication to active treatment of injuries to this ligament. Such treatment should be avoided only when the radiograph shows the typical shadow.

At the elbow ossification in either of the collateral ligaments is sometimes seen, but, since the elbow is never treated actively for any articular sprain, this has little bearing on treatment.

Ossification of the tendon of insertion of the adductor magnus muscle at the medial femoral condyle (riders' bone) appears not to occur nowadays in England.

**4. Bursitis.**

Inflammation of a bursa (other than the subdeltoid) from whatever cause is made worse, or at best is unaffected, by massage. The treatment of bursitis is rest, heat, protection, and if necessary, aspiration. If these fail, excision may be required in some situations. Massage must not be given to the subdeltoid bursa during any but the first stage of its inflammation.

**5. Infective Arthritis.**

Friction to the capsule of the joint is most harmful in the acute and subacute stages of rheumatoid, infective and villous arthritis; in the chronic stage it is probably useless, but no more so than any other physical treatment at present known.

**6. Perineuritis.**

Theoretically it is just as unreasonable to give friction to a tendon as to a nerve-sheath; for both are fibrous structures whose outer surface can suffer from excessive friction. Nevertheless, in practice deep massage to a tendon is as beneficial as it is harmful when applied to a nerve-sheath.

"Nerve-frictions" are, in my experience, wholly valueless.

## CHAPTER IV

## PASSIVE MOVEMENT

TO-DAY passive movement is under a cloud, but quite undeservedly so. Emphasis on active movement is justified in rehabilitation after reduction of fractures and orthopædic operations, though even in these conditions passive movements have a restricted scope. In a number of common disorders, on the other hand, passive movement plays a vital part in treatment. It must be realized that mobility at a joint is maintained or restored by movement *at that joint*; the agency is immaterial. Whether a movement is performed actively or passively has a profound influence on muscle tone and power; but the effect on the joint itself of movements of equal range is the same, whether they are carried out by the patient's own muscles or passively.

A number of movements exist that cannot be carried out actively; some others are voluntarily performed only with great difficulty owing to the mechanical disadvantage at which some muscles work (*e.g.* flexion at the knee). At many joints, therefore, it is almost or quite impossible for a patient actively to overcome limitation of movement. Moreover, after a fracture, an operation, or a sprain, discomfort and apprehension often combine to limit movement to a greater extent than is necessary for the protection of the damaged structure. Particularly in recent cases, therefore, passive movement is often called for in maintaining movement at a time when adequate active movement is beyond the patient's powers.

Three principles should be borne in mind:

(1) Patients themselves should not be expected to break adhesions at their joints.

(2) Patients themselves should not be expected to stretch out the capsule of a large joint.

(3) Patients themselves should not be expected to reduce intra-articular displacements.

In each case the hope is vain; the movements required must be carried out passively by a skilled manipulator.

Passive movements fall into five categories—namely: (1) Mobilization, (2) Slow Stretching, (3) Manipulation, (4) Gentle Movements, and (5) Continuous Traction.

## 1. MOBILIZATION

The forcing of the full range of all the normal movements at a joint is known as mobilization. This word is also properly used for any freeing of adherent structures, *e.g.* a scar in the skin from underlying tissues. Mobilization is always used for the same purpose: to stretch out and rupture adhesions about a joint that are limiting movement or causing pain. The movement is essentially a quick jerk, whose cardinal use is to disengage the adherent scars that follow an injury when healing has been allowed to take place without adequate movement. Adhesions, which later have to be ruptured by mobilization, are liable to hold ligaments abnormally adherent to subjacent bone (especially at the knee and ankle) or to form about the capsule of a joint (*e.g.* the shoulder).

### Chief indication for Mobilization.

This is provided by a lesion in the chronic stage affecting a single inert articular structure. This is most often shown clinically by a small degree of limitation of movement in one or two directions only. If more than one movement is limited, mobilization may still be considered as long as movement in one direction remains full; for this shows arthritis to be absent. Limitation of movement in every direction shows that a diffuse capsular lesion is present, except at the shoulder where it may indicate either capsulitis or subdeltoid bursitis. In such cases mobilization by the fractional method may still be a useful measure, but judgment has to be exercised in the selection of cases.

### Extent of Mobilization.

Before mobilizing a joint it is essential to know its range of movement. For example rotation in full flexion often has to be undertaken at the knee-joint, though it is a movement that the patient hardly ever uses and may not know to exist. This rule applies equally to a formal mobilization and to the

## CHAPTER IV

## PASSIVE MOVEMENT

TO-DAY passive movement is under a cloud, but quite undeservedly so. Emphasis on active movement is justified in rehabilitation after reduction of fractures and orthopædic operations, though even in these conditions passive movements have a restricted scope. In a number of common disorders, on the other hand, passive movement plays a vital part in treatment. It must be realized that mobility at a joint is maintained or restored by movement *at that joint*; the agency is immaterial. Whether a movement is performed actively or passively has a profound influence on muscle tone and power; but the effect on the joint itself of movements of equal range is the same, whether they are carried out by the patient's own muscles or passively.

A number of movements exist that cannot be carried out actively; some others are voluntarily performed only with great difficulty owing to the mechanical disadvantage at which some muscles work (*e.g.* flexion at the knee). At many joints, therefore, it is almost or quite impossible for a patient actively to overcome limitation of movement. Moreover, after a fracture, an operation, or a sprain, discomfort and apprehension often combine to limit movement to a greater extent than is necessary for the protection of the damaged structure. Particularly in recent cases, therefore, passive movement is often called for in maintaining movement at a time when adequate active movement is beyond the patient's powers.

Three principles should be borne in mind:

(1) Patients themselves should not be expected to break adhesions at their joints.

(2) Patients themselves should not be expected to stretch out the capsule of a large joint.

(3) Patients themselves should not be expected to reduce intra-articular displacements.

In each case the hope is vain; the movements required must be carried out passively by a skilled manipulator.

method is most often employed for capsular contracture at the shoulder and knee.

## 2. SLOW STRETCHING

When the capsule of a joint is to be stretched out, the quick movement that ruptures adhesions is inappropriate, for it serves only to provoke further muscular spasm. To stretch out a tough structure requires a long steady pull maintained for several minutes. This technique is most often required in the treatment of the capsular contracture caused by immobilization, osteo-arthritis and spondylitis deformans.

## 3. MANIPULATION

This is a general term for any manœuvre carried out by the hands. In these pages it is used to designate forced movements with a special purpose other than increasing movement at a joint. These objects are :

(*a*) *To reduce an intra-articular displacement.* The reduction of a dislocated meniscus at the spinal, knee- or jaw-joints provides examples. In such cases, where practicable, the manipulation is performed under strong traction. The reduction of intra-articular displacements forms a most important part, hitherto much neglected, of manipulative work, especially at the lumbar, cervical and knee joints.

(*b*) *To stretch an extra-articular structure.* Instances are provided by either of the manipulations described for the relief of tennis-elbow, and by the stretching of the sterno-mastoid muscle in congenital torticollis.

(*c*) *To correct deformity.* The reduction of a fracture or a carpal subluxation comes under this heading. Again, when a rickety infant's tibia is straightened by manual pressure, no movement normally in existence is forced.

## 4. GENTLE MOVEMENTS

These are used to maintain and gradually increase the range of movement at joints which are at or near the site of

gentle movements given by the physiotherapist soon after an injury.

**After-treatment of Mobilization.**

The importance of after-treatment cannot be overstressed. Unless this is carried out fully and promptly the mobilization seldom does much good; for, in the absence of adequate movement after the adhesions have been ruptured, they quickly reform. The patient must have the range of movement that was obtained under anæsthesia repeated at the earliest possible moment afterwards—before he leaves the couch, and again not later than the following morning. Much insistence, help and encouragement must be given by the physiotherapist to achieve this important result, and in patients unable to bear pain well or in whom strong scars parted only after much forcing, great patience and persuasion may be required. Nevertheless, the after-treatment of mobilization is, if anything, more important and more difficult than the original forcing under anæsthesia. The physiotherapist should be present at the mobilization, and must report at once all cases in which she cannot afterwards reproduce the range obtained under anæsthesia.

The physiotherapist should see patients with lesions of any severity once daily for at least the first week. She should first ask the patient to demonstrate how much active range he has and then increase the range passively until the limit attained under anæsthesia is reached. This may be quite easy, or take some time. The patient is then asked to repeat these movements himself. Finally he is shown exercises designed to maintain the range of movement of the joint in each direction, and asked to carry them out several times a day.

**Fractional Mobilization.**

By this is meant the forcing of movement at a joint without any attempt to reach the extreme of range; in other words, mobilization by stages. It is used when a complete mobilization would provoke an excessive reaction and thus defeat its own ends. The movement is carried out slowly, pressure being continued until one group of adhesions is felt to part. This

**Contra-indications to Forced Movement.**

### 1. *Symptoms of Activity*

Pain in the absence of movement, especially at night, wide reference of pain, and inability to lie in bed bearing weight upon the affected joint, all indicate that the lesion is in the active stage. In such cases forced movement would merely serve to increase the inflammation.

### 2. *Signs of Activity*

Local heat, synovial swelling, effusion and muscular spasm all demonstrate that the lesion is in the active stage. In such conditions as tuberculous arthritis the presence of muscular spasm provides a permanent bar to all forcing. Limitation of movement in every direction, though it points to the danger of a formal mobilization, does not necessarily contra-indicate fractional mobilization. The symptoms mentioned above afford the criterion.

*Exception.*—The symptoms and signs of activity set out above are commonly present in chronic internal derangement of a joint, especially at the cervical, lumbar and knee joints. If, therefore, a diagnosis of persistent displacement of a fragment of intra-articular cartilage has been arrived at, the above criteria of activity, far from contra-indicating forced movement, often call for an immediate attempt at manipulative reduction of the displacement.

### 3. *Lapse of Time*

Six weeks is often arbitrarily chosen as the period that must elapse after the accident before mobilization is safe. As a low limit, it is unexceptionable; otherwise it is a most unreliable figure. For example, at the shoulder-joint, the passage of many months, even a year, may have to be awaited.

### 4. *Special Joints*

Forced movements of any sort should never be used for stiffness at the elbow-joint. Passive attempts at stretching out the joint are apt to diminish rather than increase the range of movement; moreover, there is the ever-present

an injury. They act by preventing the formation of unwanted adhesions.

The force with which gentle movements should be applied must strike a balance between an excess of vigour and an excess of gentleness. The movements must not be so forcible as to overstretch the fibrils normally attached within the healing area; nor should they be too gentle to disengage fibrils that are forming abnormal attachments. A safe rule is to push movements to the point of discomfort but not of pain. All the possible movements of the joint should be attempted passively, one by one, and a small but definite increase in the range of movement should be achieved each day. The patient then repeats these movements actively.

*In fractures* two opposite requirements often conflict. The fracture must heal in the absence of movement so that dense adhesions may form and lead to bony union. On the other hand, any associated injury to soft parts must heal in the presence of enough movement to avoid adhesions. Sometimes, as in Colles's fracture, maintenance of reduction by splintage is the overriding consideration, in which case the associated sprain of the ulnar collateral ligament has for the moment to be disregarded. By contrast, in a fracture of the surgical neck of the humerus it is the fracture that should be disregarded and the soft parts that receive immediate treatment.

Gentle movements are also required to maintain the range at joints the muscles about which are paralysed.

## 5. CONTINUOUS TRACTION

This technique has been used for a long time in the treatment of fractures, but is also extremely useful in the reduction of cervical intra-articular subluxations. In a number of cases in which manipulative reduction has failed, this manœuvre has succeeded in abolishing all pain within a day or two.

Contracture of muscle caused by ischæmia or prolonged immobilization can sometimes be partly overcome by continuous traction or by pressure splintage. Once the increased range of movement has been secured it must be maintained by exercises and, if necessary, by intermittent splintage.

Though spondylitis deformans may be regarded as a type of infective arthritis, forced movement without anæsthesia is sometimes very useful.

### 7. *Specific Arthritis*

Some movement may remain at a joint after a gonococcal or septic arthritis. Forcing under anæsthesia yields no permanent benefit, but has yet to be tried during pencillin therapy.

danger of setting up myositis ossificans in the brachialis muscle. In fact, the only common object of manipulating the elbow is the relief of tennis-elbow—an extra-articular condition.

Localized adhesions at the wrist are broken up more easily by deep massage, and other types of limitation do not respond. Lesions of the hip-joint seldom benefit from mobilization under anæsthesia. The digital joints of the hand also respond badly.

Mobilization is contra-indicated in the treatment of those joints and ligaments the tension on which is not under voluntary control. These are the acromio-clavicular, sterno-clavicular, sacro-iliac, and sacro-coccygeal joints, the symphysis pubis, the cruciate at the knee, and the inferior tibio-fibular ligaments. Once these ligaments are over-stretched further stretching can only do harm.

### 5. *Radiographic Appearances*

Considerable change visible on the radiograph indicates the presence of structural alterations that cannot be overcome. Thus an essential proviso to mobilization is a normal X-ray picture, except at the spinal, knee, ankle and tarsal joints where lesser degrees of osteophyte formation may be ignored. By contrast, mobilization, even if fractional, is by no means necessarily safe merely because the radiographic appearances prove normal. Early infective arthritis, secondary malignant deposits, sacro-iliac laxity and fragmentation of an inter-vertebral disc, for example, may all be made worse by mobilization ; yet the radiograph may reveal no abnormality.

### 6. *Rheumatoid and Infective Arthritis*

In the acute or sub-acute stages, every manipulative procedure is strongly contra-indicated. In the chronic stage, when fibrous fixation of the joint has taken place in a bad position, the deformity may be slowly corrected by forcing under anæsthesia followed by immobilization in plaster in the improved position. This may be repeated several times at intervals. This treatment should not be attempted if the radiograph shows such juxta-articular rarefaction of bone that the bone is more likely to fracture than the joint to move.

own body-weight may be thus employed, *e.g.* in the treatment of an equinus deformity.

Assisted exercises are also useful in obtaining full retraction of the chest-wall at the extreme of voluntary expiration ; the assistance is then given by the physiotherapist's or patient's own hands. When, however, the patient is taught to raise his diaphragm to its fullest extent by drawing in his upper abdomen at the end of expiration, this is an example of one set of muscles giving assistance to another.

### 3. Resisted Exercises.

These have the purpose of strengthening muscle. It should hardly be necessary to state again the obvious truth that massage and passive movements contribute nothing towards strengthening muscle. The power of a muscle depends entirely on how well and how often the patient uses it. Use against resistance, whether of the body-weight, of an appliance, of the patient's other muscles, or given by the physiotherapist, is, of course, far more effective than mere unimpeded active movement. The atrophy of muscle that is an invariable consequence of arthritis, immobilization or disuse should be combated by resisted exercises. The optimum degree of resistance is that which the patient is just able to *overcome* ; it should be applied evenly, elastically and maintained to the very end of the movement. Whether the resistance is applied by the physiotherapist, by means of springs and pulleys, by the strength of the patient's other limb or by his body-weight is in theory immaterial. In practice much time and staff are saved, when a large number of patients are to receive similar treatment, if suitable apparatus is to hand. In the later stages of rehabilitation, gymnastic classes, occupational therapy, drill and organized games increase muscle power, control and physical fitness.

For the correction of a deformity a muscle must be over-strengthened and kept so. Thus, in the treatment of scoliosis or of a genu valgum due to a taut biceps muscle, resisted exercises may have to be continued until bone growth ceases in the patient's early twenties. Equally, when compensation for laxity of the cruciate ligaments has to be achieved by over-strengthening the quadriceps muscle, the exercises should be kept up indefinitely.

# CHAPTER V

## ACTIVE MOVEMENT

SO far as the treatment of deformity and the results of injury or overstrain are concerned, exercises fall into two main categories—namely, those for muscles and those for joints. Since the type of exercise required depends entirely on its *purpose*, clarity on this point is essential.

### EXERCISES FOR MUSCLES

**1. Active Exercises.**

These are used to prevent adhesions forming within or about a muscle. Thus they are called for equally after a few fibres have been torn within a muscle as in the avoidance of adherence of muscle to bone, *e.g.* to the callus of a fracture of the femoral shaft. To send a patient back to heavy work soon after minor damage to a muscle is mistaken policy; for he is apt either to hold the part stiffly (thus avoiding therapeutic movement) or to allow a series of excessive pulls on the healing breach, each leading to a relapse. Active movement of the muscle suffices for the formation of a supple scar that becomes painless quickly. Since it is full broadening of a muscle that is so important, the active exercises must include voluntary movements designed to contract the muscle to its fullest extent. Passive movements are, of course, valueless in the treatment of recent muscular injuries. Resisted exercises should be employed only when recovery is nearing completion.

**2. Assisted Exercises.**

When a muscle is short and has to be stretched out, resisted exercises increase its tone and are therefore contra-indicated. Active exercises alone are ineffective, but active movements in the required direction strongly assisted by the physiotherapist are often successful. Alternatively, the patient's

along the nerve. For this purpose the patient should be taught how to perform the requisite movements for himself; for example, by using other muscles of the same limb (*e.g.* climbing up a wall by means of the fingers in paralysis of the abductors of the shoulder), by assisting the movement with the other limb or by using gravity, a pulley or body-weight. Such patients should be kept under periodic observation; clearly they do not require to attend hospital several times a week for passive movements for a palsy.

**2. Passive, then Active Movements.**

These are used to increase the range of movement of a joint. Joints at which adhesions limit movement must, wherever possible, have the range increased until it is full in every direction. The proper technique for increasing movement at a joint is passive forcing followed by the patient's immediate repetition of the movement.

In the treatment of postural deformities of the spine the greatest possible correction should be attained passively, before giving the exercises that maintain it.

**3. Static Contractions and Exercises so Resisted that no Movement occurs.**

These are employed when a diminished range of movement at a joint is desirable. A joint may be so disorganized that all movement is painful, and the patient too elderly for an operation like arthrodesis. This is often the position in advanced osteo-arthritis of the hip. An attempt to stabilize the joint by increasing the strength and tone of the muscles about it may be made by the use of faradism, static contractions or exercises so resisted that no movement takes place. Exercises are given for the same reason to the short flexor muscles of the foot in the treatment of strain of the mid-tarsal joint or plantar fascia. The increased strength of these muscles diminishes articular movement, thus relieving the fibrous structures of excessive stress.

## FARADISM VERSUS EXERCISES

Voluntary and involuntary contractions of normally innervated muscle have identical effects. In general, however,

**4. Active Movement under Local Anæsthesia.**

In the immediate treatment of any muscular injury, the unrestricted movement that local anæsthesia secures possesses great therapeutic value. Movement under local anæsthesia produces its most spectacular results in recent rupture of some fibres of the gastrocnemius muscle.

**5. Exercises resisted within the Free Range.**

These are useful in acute traumatic arthritis of the elbow-joint when spasm of the brachialis muscle limits extension. The only safe way to encourage this muscle to relax is reflexly, *i.e.* by giving resisted exercises to the triceps muscle—its antagonist. The movement must be so resisted that the extreme of the possible extension range is never reached.

## EXERCISES FOR JOINTS

Contrary to general belief, mobility is maintained at a joint just as well by passive as by active movement. Provided that the joint is moved the agency is immaterial. It is the muscles about a joint, not the joint itself, that are influenced by the type of the movement.

**1. Active Exercises.**

These are employed to retain mobility at a joint, at times slowly to increase range. Their cardinal use is to keep normal structures normal. Thus all the joints of an injured part not actually immobilized should be put through their full range of movement daily, preferably actively, and therapeutic occupations selected that bring the limb into effective play. The after-treatment of many reduced fractures and orthopædic operations involves the performance of a suitably graded series of exercises. In such cases passive movements are usually valueless, the joint recovering at a fixed maximum rate that is attained only when the proper exercises are conscientiously performed. In the case of the lower limb, exercises without weight-bearing precede those carried out standing up.

When injury to a nerve has led to muscular paralysis, the full range of movement at the joints served by the paralysed muscles must be preserved pending the return of conduction

## CHAPTER VI

## REHABILITATION AFTER INJURY

### SUMMARY OF TREATMENTS

**1. Injury of Bone.**

Alternatives:

(*a*) Ignore the fracture and treat only the soft parts by passive movement, then by exercises.

(*b*) Splint the fracture and treat the soft parts by exercises.

Local anæsthesia may need to be induced between the bone ends for—

(*a*) Manipulative reduction.

(*b*) Pain at the site of fracture.

(*c*) Encouraging mobility of the soft parts.

**2. Injury to Muscle.**

(1) Partial rupture.

(*a*) Aspirate the hæmatoma.

(*b*) Induce local anæsthesia during the first week only, and follow by active off-weight exercises.

(*c*) Deep massage to the torn fibres while the muscle is held in full relaxation; follow by active exercises.

(*d*) Avoid resisted exercises until recovery is well established.

(*e*) Stretch out if necessary.

(2) Complete Rupture.

Operative suture.

**3. Injury to Tendon.**

(1) Complete rupture.

(*a*) Suture.

(*b*) Leave.

(2) Partial rupture.

Massage to the site of injury and avoid painful movement.

exercises are always preferable to faradism because it is only in this way that the patient's mind is brought to bear. Moreover, emphasis on faradism results in the patient's believing that his muscle should receive periodic passive treatment, whereas he should in fact devote much time himself to exercises and graduated work for the weak muscle.

Enough attention is not always paid to the fact that it is the full broadening out of muscle that separates the fibres most. Deep massage has this effect when given transversely. If, for some reason, adequate massage cannot be obtained for a patient with a suitable recent lesion, full contraction as well as full stretching must be secured in other ways. If the muscle is to be treated by electrical stimulation, he should be put into the position of full relaxation of the affected muscle before the faradic contractions are begun.

The occasions when faradism should precede exercises—not, it should be noted, be substituted for them—can be briefly summarized as follows :

(1) If the patient cannot grasp what is wanted of him or is too frightened to attempt a movement of which he believes himself incapable.

(2) If the joint has to be kept still—*e.g.* on account of a recent operation on the joint or the immobilization of the limb in plaster. For example, the vastus medialis muscle is exercised adequately only when the knee is exercised towards full extension. If more immediate considerations prevent this, faradism is the obvious alternative.

(3) In special areas where control over the muscles is poor. This applies chiefly to the feet, where so little real voluntary control exists that a faradic foot-bath should almost always precede active exercises. Again, in some cases of ptosis of the eyelid, faradism to the levator palpebræ muscle is more effective than exercises alone.

(4) In conversion hysteria. If the patient sees the movement that he believes he cannot perform take place, the idea of this impossibility may be quickly dispelled. Moreover, the passage of the current is unpleasant ; thus it may be used with immediate effect in many types of functional disorder.

(2) Recurrent dislocation.
  (*a*) Resisted exercises to one muscle; stretch out the antagonist.
  (*b*) Operation.

(3) Joints and ligaments unsupported by muscles.
  These are: Acromio-clavicular joint.
  Sterno-clavicular joint.
  Sacro-iliac joint.
  Sacro-coccygeal joint.
  Symphysis pubis.
  Cruciate ligaments of the knee.
  Collateral ligaments of the knee.
  Inferior tibio-fibular ligament.
  (*a*) Rest.
  (*b*) Support.
  (*c*) Massage to capsule where accessible.
  (*d*) *No* exercises.

(4) Joints with muscles about them.
  *N.B.*—Each joint is different.
  (*a*) *Shoulder:*
    (1) recent injury: gentle forcing and exercises.
    (2) Capsular contracture: forcing under anæsthesia and exercises.
    (3) Subdeltoid bursitis: (1) recent: massage and rest.
      (2) chronic: local anæsthesia.
  (*b*) *Elbow:* splintage in flexion.
  (*c*) *Wrist:* massage to sprained structure.
  (*d*) *Trapezio-first-metacarpal joint:* massage to capsule.
  (*e*) *Finger-joints:* wait.
  (*f*) *Hip:* rest in bed until the full range of movement returns.
  (*g*) *Knee:* (1) Massage to the site of sprain; then movements, passive and active; then exercises to quadriceps and instruction in gait.
    (2) Mobilization under anæsthesia.

(3) Teno-vaginitis.
 (*a*) Massage and avoid painful movement.
 (*b*) Operation, *i.e.* slit up the sheath.

(4) Snapping.
 (*a*) Leave.
 (*b*) Operation.

(5) Trigger.
 (*a*) Leave.
 (*b*) Plastic operation on the tendon sheath.

(6) Teno-periosteal tear.
 (*a*) Stretch out by manipulation.
 (*b*) Splint in relaxation.
 (*c*) Deep massage.

*N.B.*—Local anæsthesia is useless in every type of tendinous lesion except calcification.

### 4. Injury to Ligament.

(1) Partial rupture.
 (*a*) Local anæsthesia: first day only.
 (*b*) Deep massage where accessible.
 (*c*) Passive movements to the joint and then the same movements repeated actively.
 (*d*) Resisted exercises for the muscles; first off-weight, then weight-bearing.
 (*e*) Mobilization under anæsthesia and after-treatment.

(2) Complete rupture.
 Treatment as above, but with slower progress to exercises and weight-bearing.

(3) Permanent laxity.
 (*a*) Leave; prescribe exercises to compensate.
 (*b*) Operation.

(4) Ossification.
 (*a*) Leave.
 (*b*) Operation.

### 5. Injury to Joint Capsule.

(1) Dislocation.
 Reduce and follow by exercises.

(2) Recurrent dislocation.

(*a*) Resisted exercises to one muscle ; stretch out the antagonist.

(*b*) Operation.

(3) Joints and ligaments unsupported by muscles.

These are : Acromio-clavicular joint.
Sterno-clavicular joint.
Sacro-iliac joint.
Sacro-coccygeal joint.
Symphysis pubis.
Cruciate ligaments of the knee.
Collateral ligaments of the knee.
Inferior tibio-fibular ligament.

(*a*) Rest.

(*b*) Support.

(*c*) Massage to capsule where accessible.

(*d*) *No* exercises.

(4) Joints with muscles about them.

*N.B.*—Each joint is different.

(*a*) *Shoulder :*

(1) recent injury : gentle forcing and exercises.

(2) Capsular contracture : forcing under anæsthesia and exercises.

(3) Subdeltoid bursitis : (1) recent : massage and rest.
(2) chronic : local anæsthesia.

(*b*) *Elbow :* splintage in flexion.

(*c*) *Wrist :* massage to sprained structure.

(*d*) *Trapezio-first-metacarpal joint :* massage to capsule.

(*e*) *Finger-joints :* wait.

(*f*) *Hip :* rest in bed until the full range of movement returns.

(*g*) *Knee :* (1) Massage to the site of sprain ; then movements, passive and active ; then exercises to quadriceps and instruction in gait.

(2) Mobilization under anæsthesia.

(*h*) *Tarsus :* (1) Massage ; then passive and active movement ; then instruction in gait.
(2) Subacute traumatic arthritis : rest in plaster.

(*i*) *Toes :* protect.

**6. Internal Derangement of Joints.**

This occurs at : Jaw.
Elbow (loose body).
Wrist (carpal subluxation).
Spinal joints (disc-lesion).
Knee (meniscus or loose body).

(*a*) Reduce the displacement by manipulation and maintain reduction by (1) posture, and/or (2) appliance.

(*b*) Reduce by sustained traction (spinal joints).

(*c*) Epidural local anæsthesia (lumbar spine only).

(*d*) Excise the loose fragment.

(*e*) Arthrodesis.

## CHAPTER VII

## BONE-SETTING

BONE-SETTERS are people who practise manipulation. The fact that they erroneously believe—or say they believe—some bone to be out of place and that their manipulation reduces this subluxation does not alter the fact that their treatment consists of mobilizing the joints near the place that the patient complains of. Osteopaths and chiropractors do the same, but hold the view that all illness comes from spinal subluxations. In practice they pay little attention to this theory, in so far as they too will mobilize the joint indicated by the patient and not the spinal joints alone. In fact, therefore, if not in theory, these manipulators all employ more or less identical methods.

No one can deny that such empirical manipulation, no matter on what premise it is based, may cure the patient, often after the medical and physiotherapy professions have tried and failed. The fact that a bone has been declared out of place, a crack is heard, and full relief has followed appears to the patient to prove the correctness of this diagnosis. The inherent unlikelihood of a vertebral subluxation, so slight as not to be demonstrable by radiography, being detected in a deeply-lying joint on palpation by a bone-setter does not diminish the patient's faith; on the contrary it serves to demonstrate how delicate a touch the bone-setter has developed.

Cure by manipulation can be no proof of the existence of a subluxation: it shows one thing only—that manipulation was the correct treatment. For example, mobilization of the knee on a diagnosis of subluxation of the tibia may well lead to a full and dramatic recovery if, for instance, dislocation of a meniscus is reduced or adhesions about a ligament are ruptured. There is no doubt too that, for many years past, protrusions of part of an intervertebral disc have been reduced by osteopaths—on an erroneous diagnosis, it is true, but with occasional dramatic cure. This result has naturally been regarded by both patient and osteopath as manifest confirmation of the diagnosis of a vertebral subluxation—an idea

that was not so far wrong, after all. In fact, it is clear from the mere shape of the bones no less than from clinical and radiological evidence, that the alleged vertebral subluxations which are the ostensible reason for bone-setters' manipulations do not occur. No evidence beyond the fact of cure following manipulation has ever been adduced by them that such lesions do in fact exist, and it is clearly up to those who postulate so improbable a hypothesis to gather together some reasons for their beliefs.

Cases of pain referred from spinal structures may cause considerable difficulty in diagnosis. Pain felt in the anterior thoracic or abdominal wall may be attributed to a visceral lesion, since the resemblance to angina, pleurisy, cholecystitis, appendicitis or renal colic may be considerable. Clearly the lesions actually present could be relieved by manipulation of a spinal joint. The osteopath, hearing that a medical practitioner has made a diagnosis of some visceral lesion and finding that his manipulations have cured the patient, so far from therefore suspecting the accuracy of the diagnosis, may quite honestly believe that he has cured visceral disease. This is just ignorance; but the step from the supposed cure of a visceral lesion by manipulation to the postulate that all lesions have a spinal origin is a small one.

The fact of the existence, and successes, of bone-setters shows how neglectful many medical men are of manipulation as a therapeutic measure. After all, patients drift to the unqualified only after their own doctors have failed to relieve them or to direct them to a medical man who has experience in that field. The treatment of muscular and ligamentous lesions by rest provides a large number of patients for the bone-setters later on; hence physiotherapy should be widely employed in such cases so that chronic disability is never allowed to supervene. Only by timely co-operation between doctors and physiotherapists can the creation of work for those who practise mobilization be avoided—the qualified and unqualified alike.

Were bone-setters and osteopaths to drop their exaggerated claims and unfounded beliefs, and to adopt the ethics of the physiotherapy profession, maintaining an adequate curriculum and examinations, putting themselves forward when qualified as skilled manipulators ready thus to treat patients sent for

this purpose by medical practitioners, all reproach against them would cease. Nevertheless, it is slightly ridiculous that, at a time when deep massage and manipulative methods are beginning to be recognized as complementary, two professions should exist side by side, the one laying the greater emphasis on exercise therapy and massage, the other on forced movements. Clearly all physiotherapists should—and some of them do—know how to perform the various manipulations that are asked of them. Similarly every bone-setter and osteopath should be an expert masseur. It follows that if the C.S.P. syllabus were made to conform with modern concepts on pathology and treatment, it would become equally suited to both professions. As a result, we should have one set of medical auxiliaries of acceptable ethics and educational standards, expert in every type of manual treatment.

## THE CASE FOR ACCURATE PHYSIOTHERAPY

In 1945, when the new C.S.P. syllabus was first published, a physiotherapist wrote to the *Journal* comparing the amount of space allotted to massage and manipulation on the one hand and to electrotherapy on the other. She pointed out that electrotherapy filled two and a half pages—a clear pointer to the complexity of the subject and the need for precision in treatment; by contrast deep massage and manipulation were dismissed in a few lines. Perusal of this syllabus would lead anyone to infer that the teachers regard remedial massage and manipulation as only a trifling part of physiotherapists' normal duties. *Deep massage, it would seem, is so seldom* called for as to make mere mention of its existence suffice, and manipulation falls so largely outside the scope of physiotherapy as to render detailed inclusion unnecessary.

Readers of this book know that this is not my view. Experience at a mixed clinic has taught me that patients suitable for treatment by exercises, or manual methods, or electrotherapy present themselves in about equal numbers. Thus, electrotherapy and manual work possess an approximately equal importance in the treatment of patients. Moreover, at least as great precision must be employed in the administration of deep massage or in performing a manipulation as in electro-

therapy; for each, improperly carried out, can be actively harmful. Furthermore, it takes at least as long to learn accurate manual techniques as to master the use of electro-therapeutic apparatus.

Readers may thus ask themselves what reactionary forces withhold tuition in the physiotherapy schools on (1) massage to named structures, (2) manipulation for specific purposes. To-day the student can study for three years without receiving any real teaching on, and pass her examinations without enquiry into her familiarity with, these two important branches of her work. It is not for want of insistence on my part that this hiatus still gapes. At lectures and in print I have stressed my advocacy of this simple, small—but vital—addition to the curriculum. I have repeated myself so often that, rather than become wearisome, I no longer trouble the pages of the *Journal* with articles on the subject. Nevertheless, it is as sad as it is unreasonable that now, when the curriculum has just been extended for six months, it still remains impossible for time to be found to teach students the only effective way of dealing with a number of conditions which they are commonly called upon to treat.

For patients quickly curable by deep massage or manipulation there is often no alternative method yielding at all comparable results. A doctor may request that massage should be given to a structure that he specifies, or that a manipulation of known effect should be carried out. Only discredit to the profession follows if the physiotherapist has to admit that during her training she was not taught the simple manual methods which any medical man would regard as well within her province. Yet further discredit accrues when some self-styled rubber or manipulator rapidly cures the patient, after the combined efforts of the medical and physiotherapy professions have failed. To-day this is an all-too-frequent occurrence. In consequence bone-setters and osteopaths, however little they may be thought of by medical men, are held in high repute by many intelligent laymen. It should thus be a point of honour with the physiotherapy profession that no patient relievable by manual methods should ever reach the unqualified manipulator. The principle should be: *Any patient curable by manual treatment given by an osteopath or a bone-setter should already have been cured by the same*

*measures, or one more effective, carried out by a physiotherapist.* This attitude would in due course transfer doctors' and patients' esteem to the physiotherapy profession and, since its members work wholly under medical guidance, would avoid the evils of the other aspect of unqualified manipulation—namely, repeated treatment given without avail or with hurt in cases unsuited to such treatment.

In my opinion, the physiotherapy profession to-day waits on its teachers and examiners. In their hands lies the future capacity of physiotherapists to deal properly with every type of case demanding accurate treatment. Every student must be taught at least one method—not necessarily that set out in this book—for affecting each of the structures of the body disorders of which are known to respond well to manual treatment. Whichever method is eventually chosen as the most effective should then be standardized, be taught to students and form part of the practical examinations.

Those who think as I do—and I know that there are some—must combine to strike a blow for their profession by insisting to their former teachers that the present gap in students' teaching need not and must not continue. Such pressure from within the profession may well succeed where I, putting forward these proposals from outside, have so signally failed.

PART TWO

# THE ILLUSTRATIONS: SUMMARIES OF PROCEDURES AND RESULTS

## GENERAL REMARKS ON THE ILLUSTRATIONS

ALL except a few photographs (cervical manipulations) are taken with the patient on a couch fifteen inches high. We have found this height the most generally useful for all types of remedial massage, since it enables the physiotherapist to sit comfortably at her work. It has the disadvantage of making her bend rather far during certain manipulations, but these are carried out so quickly that it has proved hardly worth while to provide a higher couch for this purpose. However, certain manipulations of the neck are more easily carried out on a higher couch, and this is shown in the relevant illustrations. If the choice between a high or a low couch has to be taken, it should be realized that the procedures set out in this book can *all* be carried out properly on a low couch, whereas many are quite incapable of performance on a high one.

There are, with few exceptions, several ways of giving manual treatment to any one structure. The method chosen for illustration has been the simplest, the least open to misconstruction and the most suitable for photographic representation. No claim is made that the best method has been illustrated throughout, since for many structures there is no one way that markedly surpasses others. In many instances the physiotherapist can, by reversing her position, approach the same tissue in the same way from the opposite direction. Often the same structure can be given massage alternatively with the finger or thumb and with either hand. Sometimes, too, several different grips can be employed for the same manipulation. Depending on the shape and size of the hand and on the respective strengths of the fingers and thumb, different physiotherapists prefer to accomplish the same movement in different ways. It is my hope that physiotherapists will try the methods set out in this book and, once fully familiar with the movement to be imparted, modify them to suit their own predilections.

In the case of deep massage the same does not apply to the position in which the patient is placed or the exact siting of the tip of the operative digit or digits. There are structures that are out of reach of the physiotherapist's finger unless the

patient is first put into a special position. This position is then unalterable, though its manner of attainment may be alterable. For example, the position of full adduction and extension of the arm required for bringing the supraspinatus tendon within reach may be secured by having the patient sitting with his arm over the back of a chair or half-lying with his shoulder overhanging the couch ; however, the relationship of arm to trunk is invariable. The position of the physiotherapist's finger-tip is equally invariable. But, whether she prefers to sit facing the patient or to stand behind him when massaging the tendon is a matter which each physiotherapist decides for herself. Indeed, one of the ways of making deep friction less tiring is to apply it first from one position with one hand, then from another with the other. Hence, within the rigid framework of the position of the patient and the placing of the physiotherapist's operative finger or thumb, there is often much scope for individual choice on exactly how the identical massage movement is to be imparted to the structure at fault. It is by varying her posture and trying out several ways of achieving the same object that a physiotherapist learns the way that suits her best.

The caption accompanying each plate explains the reason for the postures adopted by patient and physiotherapist. The direction of the massage and the manner in which manipulations are performed are stated. Throughout the terms used apply to the patient's body in the anatomical position. Thus the term " downwards " would mean downwards in regard to the patient standing. The average results obtainable if the instructions are accurately followed are given in many cases so that a physiotherapist may know what can normally be achieved, and measure her own competence against these figures.

Not quite every structure in the body normally requiring treatment and not every manipulation is illustrated in these pages. A very few are left to the physiotherapist's imagination. If a structure is very similar to one already dealt with it is not referred to separately. For example, the fibular collateral ligament of the knee is seldom damaged, and when it is the treatment is identical with that for the tibial collateral ligament. Thus, should a physiotherapist not find the structure she wishes to affect mentioned in the book, she is referred to the

nearest analogous structure. If only a manipulative or only a frictional technique is described, this means that no alternative method of manual treatment exists. Other structures are omitted for a different reason—namely, that lesions of these structures do not appear to benefit from manual methods.

## PLATE 1

## TEMPORO-MANDIBULAR JOINT

**Site of Lesion.**—Contracture of the joint-capsule as the result of osteo-arthritis should be treated by massage. For the localized capsular lesion that results from repeated subluxation of the intra-articular meniscus, treatment by exercises is called for, or if this fails, excision may be considered.

**Frequency.**—Rare.

**Patient's Posture.**—The patient adopts the half-lying position on the couch. His head is supported and so rotated as to bring the affected joint to lie uppermost. The capsule of the joint is drawn well down beyond the zygoma by holding the patient's mouth half open with a cork between his teeth.

**Technique.**—The physiotherapist sits facing his head and applies her middle finger, reinforced by the index, along the lower edge of the zygoma. The friction is imparted by a horizontal to-and-fro movement of her whole forearm and hand.

**Duration of Treatment.**—A month's treatment of fifteen minutes' duration twice a week should be tried. Forcing of movement in each direction and exercises must follow the massage. If necessary, the jaw should gradually be forced open by continuous pressure from a dental gag.

**Results.**—Inconstant. Only half the cases do well; and for this reason, if the patient is no better at the end of a month, it is not worth while persevering.



PLATE 1

## PLATE 2

## TRAPEZIUS MUSCLE: OCCIPITAL FIBRES

**Site of Lesion.**—The ribbon of muscle is affected most often at its attachment to the occiput, frequently on both sides.

**Frequency.**—Uncommon.

**Patient's Posture.**—The patient lies face downwards, his forehead supported on a low pillow so as to keep his nose off the couch.

**Technique.**—The physiotherapist sits at the patient's side, facing his head, which she steadies with one hand. She places the tip of her middle finger, reinforced by the index, on the affected spot. By pressing upwards as well as forwards and drawing her finger horizontally to and fro, she catches the muscle against the bone at each stroke.

**Duration of Treatment.**—Ten minutes two or three times a week on each side is usually enough. More than three to six weeks' treatment is seldom required.

**Results.**—Uniformly good.

## SEMISPINALIS CAPITIS MUSCLE AT OCCIPUT

A lesion at this site is an occasional source of headache felt in the forehead as well as of pain at the upper part of the back of the neck.

The physiotherapist's technique is the same as above, except that her finger lies half an inch farther down the neck and thus presses on the occiput nearer the inferior curved line. The results are equally satisfactory.



PLATE 2

## PLATE 3

## SPLENIUS CAPITIS MUSCLE: OCCIPITAL FIBRES

**Site of Lesion.**—Bilateral and unilateral post-traumatic fibrosis occurs at the occipital insertion of the splenius capitis muscle with about equal frequency. Lesions here follow immobilization after concussion and set up pain, felt more often at the temple than at the actual site.

**Frequency.**—Uncommon.

**Patient's Posture.**—The patient lies prone on the couch, his forehead supported on a low pillow so that he can breathe easily.

**Technique.**—The physiotherapist sits level with the patient's neck, facing his head and on the side distant from the lesion. She steadies his head with one hand. She places the middle finger of the other hand, reinforced by the index, on the affected spot, which is usually placed well forwards and under the occiput. She presses upwards as well as forwards, thus catching the muscle against the bone. Her forearm follows a line at 45 degrees to the vertical, and the friction is imparted by her drawing her forearm and hand to and fro *in this alignment.*

**Duration of Treatment.**—Twenty minutes two or three times a week is adequate. Two to six weeks' treatment may be *required in chronic cases.*

**Results.**—Uniformly good.



PLATE 3

## PLATE 4

## SPLENIUS AND SEMISPINALIS CAPITIS MUSCLES: MID-CERVICAL EXTENT

**Indication for Massage.**—To allay muscle spasm limiting movement at the affected cervical joint. This should be done before manipulative reduction is attempted.

**Patient's Posture.**—The patient lies face downwards on the couch, his forehead supported on a pillow so that he can breathe comfortably.

**Technique.**—The physiotherapist sits facing his head. She places her thumb on the affected area while the fingers supply counter-pressure on the far side of the neck. This grip avoids pressure on the trapezius muscle, which is never affected at this level. The physiotherapist imparts her friction by alternately flexing and extending her wrist. By keeping her fingers still and using them as a fulcrum, the thumb is made to move over the muscles.

**Duration of Treatment.**—This should last about fifteen minutes. The attempt to effect reduction by manipulation should follow (Plates 10 to 16).



PLATE 4

## PLATE 5

## FORCED ROTATION OF CERVICAL SPINE

**Indications.**—Limitation of, or pain on, the extremes of movement at the cervical joints due to :—

(*a*) Early osteo-arthritis or diffuse capsular adhesions. In this case the movement is a quick one, intended to break adhesions.

(*b*) Advanced osteo-arthritis, or spondylitis deformans. In this case the movement is a slow stretching, intended to lengthen the contracted structure.

**Contra-indication.**—Displacement of part of a mid-cervical intervertebral disc. In this case the manipulation must be carried out during traction (see Plate 11).

**Patient's Posture.**—The patient lies supine on the couch, his shoulders level with the end of it and his neck muscles fully relaxed so that the weight of the head is entirely borne by the physiotherapist's hand.

**Technique.**—The physiotherapist stands or half kneels (depending on the height of the couch) at the patient's head. If his neck is to be rotated to the left she hooks the fingers of her left hand round the right side of his mandible. By exerting traction here the neck is extended, thereby bringing the occiput into prominence. Her right hand, which hitherto merely bore the weight of the patient's head, now obtains a better purchase. Rotation is forced—during traction—by the left thenar eminence, which is pressed (suddenly or gradually, according to the lesion present) against the patient's right maxilla. The patient must repeat the movement actively at regular intervals afterwards so as to maintain the added range.

**Caution.**—The physiotherapist must take special care not to push with her left fingers on the mandible, for this may result in painful strain of the joint.

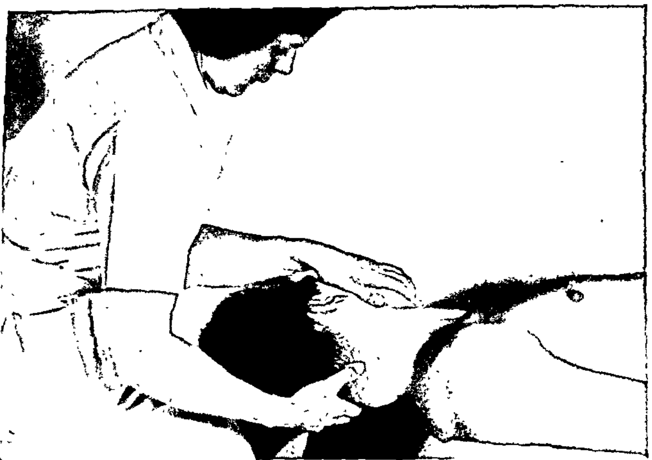


PLATE 5

## PLATE 6

## FORCED SIDE-FLEXION OF CERVICAL SPINE

**Indications.** }
**Contra-indication.** } As for forced rotation of cervical spine (see p. 60).

**Patient's Posture.**—As described on p. 60.

**Technique.**—Depending on the height of the couch, the physiotherapist stands or half kneels at the patient's head and supports it. The standing position is better because, if the couch is low, she can then apply the inner side of her knee to her hand at the moment of stress and thus increase its pressure.

The physiotherapist must take the weight of the patient's head with the least possible amount of her fingers under his occiput, since she *must* lay her thenar eminence on the side of his head above the ear. Her other hand is used purely as a fulcrum, so as to ensure that it is movement at the cervical spine that is forced. Unless such a fulcrum is provided, a general flexion movement is imparted to the whole cervico-thoracic spine.

Assuming that his neck is to be bent to the left, the physiotherapist supports the patient's head by the finger-tips of her right hand passed under the patient's occiput; she lays her thenar eminence on his temporal bone. She places her left hand, fingers pointing vertically downwards, against his left clavicle in such a way that the base of her index finger lies against the transverse process of the sixth cervical vertebra. So as to *avoid the patient's trachea, her thumb is either tucked away* in her palm (not illustrated) or kept well extended.

Movement is now forced—suddenly or gradually depending on the nature of the lesion present—by the physiotherapist strongly pushing her two hands towards each other simultaneously. By this means the patient's head is forced to the left and his neck towards the right. An acute side-flexion movement confined to the neck therefore results. In all people, whether patients or normal subjects, cracks are heard as the extreme of movement is reached.

The patient must repeat this movement several times a day afterwards, so as to maintain the added range.

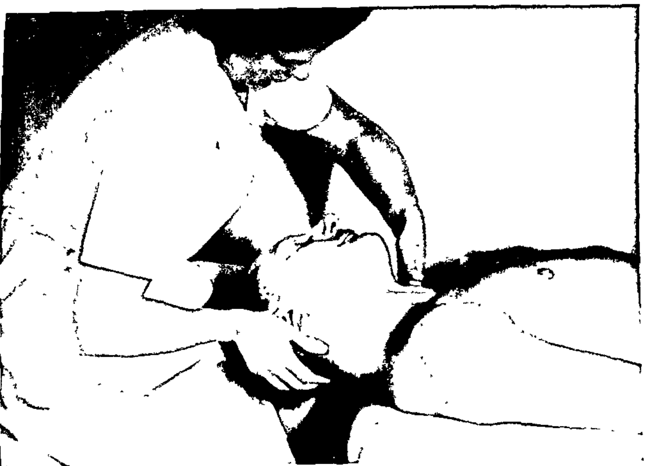


PLATE 6

## PLATE 7

## FORCED FLEXION OF CERVICAL SPINE

**Indications.**—As for forced rotation of cervical spine (see text facing Plate 5). Actually, the ability to flex the neck is seldom lost, for any deformity is usually towards flexion.

**Patient's Posture.**—The patient lies face upwards on the couch.

**Technique.**—The physiotherapist stands at the patient's head, facing his feet, and crosses her forearms. She flexes her trunk and places her fingers on his clavicles. This brings the middle of one of her crossed forearms under his occiput. By keeping her hands still and extending her trunk, she brings this forearm to bear against his occiput, thus forcing flexion of the neck.



PLATE 7

## PLATE 8

### FORCED EXTENSION OF CERVICAL SPINE

**Indications.** } As for forced rotation of cervical spine
**Contra-indication.** } (see p. 60).

**Patient's Posture.**—The patient lies supine on the couch with his shoulders well beyond the edge of the couch. Unless this precaution is taken, his head engages against the couch before full range is attained.

**Technique.**—The physiotherapist stands by the patient's side. She presses one hand on the lower part of his sternum in order to keep his thoracic spine firmly on the couch. *She extends his neck by putting her other hand on his forehead and pushing this towards the floor.*



PLATE 8

## PLATE 8

### FORCED EXTENSION OF CERVICAL SPINE

**Indications.** } As for forced rotation of cervical spine
**Contra-indication.** } (see p. 60).

**Patient's Posture.**—The patient lies supine on the couch with his shoulders well beyond the edge of the couch. Unless this precaution is taken, his head engages against the couch before full range is attained.

**Technique.**—The physiotherapist stands by the patient's side. She presses one hand on the lower part of his sternum in order to keep his thoracic spine firmly on the couch. She extends his neck by putting her other hand on his forehead and pushing this towards the floor.

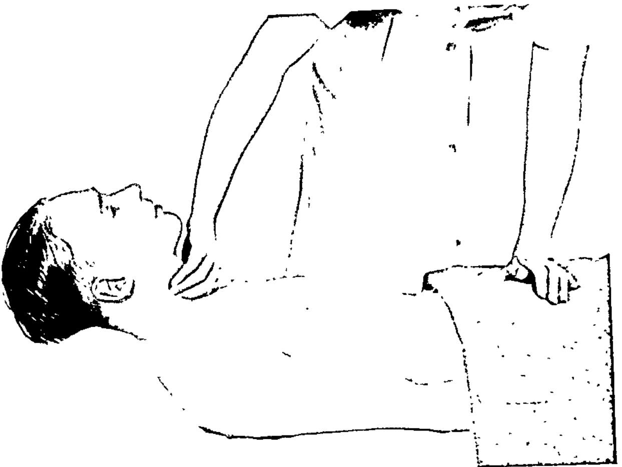


PLATE 9

## PLATE 9

## FORCED EXTENSION OF CERVICO-THORACIC SPINE

### TECHNIQUE IN CASES OF SPONDYLITIS DEFORMANS

**Note.**—The methods already described, if tried in cases of advanced spondylitis deformans, succeed in increasing the range at only the upper two cervical joints. These movements must be carried out, but in addition an effort should be made to extend the lower cervical and upper thoracic spine in all patients with any play left at these joints. Moreover, in the many patients whose condition never reaches that stage of acuteness which necessitates rest in a plaster bed, regular forcing of this movement often suffices to prevent excessive deformity. The patient must attend regularly, perhaps for some years, and co-operate in maintaining his posture between sessions.

In some early cases the technique illustrated on Plate 62 may prove adequate ; but in even moderately advanced cases the patient may not be able to lie face downwards at all. The physiotherapist should remember to force movements at the hip-joints as well (see Plates 78 to 80).

**Patient's Posture.**—The patient lies face upwards on the couch.

**Technique.**—The physiotherapist stands by the patient's side, level with his chest. She keeps his trunk on the couch by pressing with one hand on his symphysis pubis. She forms her fingers and thumb into an arch and places her finger-tips against his lower cervical transverse processes on one side of his neck and her thumb against those on the other side. By maintaining this arch pressure on his trachea is avoided. The physiotherapist now swings her body weight on to her extended arms and gradually increases her pressure. This is maintained, if possible for a minute or two, until the patient has to ask for its discontinuance. No jerk is given and she equally slowly eases her pressure.

The patient should practise this movement and those of the neck and hips every day.



PLATE 10

## PLATE 10

## MANIPULATOR'S POSTURE FOR APPLYING TRACTION

**General Remarks.**—Before any attempt is made to reduce an intra-articular displacement at a cervical intervertebral joint strong traction must be applied. By this means the joint surfaces are separated as widely as possible; in addition, the stretched articular capsule exerts centripetal force. Moreover, during such traction, the patient's pain is largely or wholly relieved ; and as a result he can now permit movements which, in the absence of traction, would have provoked agonizing pain and such spasm of muscles as would have rendered manipulation impossible. Manipulation without traction can lead to an increase of the displacement within the joint ; but this disaster cannot in my experience occur if strong traction is exerted and maintained during the whole time that movement at the affected joint is being forced. It must be remembered that not only may root-pressure be set up or increased by injudicious manipulation, but even pressure on the spinal cord itself may occur. If manipulation were to enlarge, or bring about, such a central protrusion, damage to the cord might result, from which the patient might never fully recover. Thus, the likelihood of success and the avoidance of undue pain are much enhanced by traction, which also provides the only safeguard against making the patient worse. *If, therefore, traction cannot for some reason be applied it is most unwise to manipulate at all.*

**The Couch.**—This should stand 30 to 36 inches from the ground, depending on the height of the manipulator, who should be able, while pulling, to get his centre of gravity on a horizontal level with the patient. It must be strongly built, for the legs have to withstand the strain of repeated use as supports for the manipulator's feet. Square legs are preferable to round, for on occasion the manipulator may wish to press his knee against one leg of the couch. The floor must be carpeted.

**Assistants.**—One or two are required, depending on the

manipulator's strength. At times they stand at the foot of the couch, each grasping one of the patient's ankles. At other times, they stand level with the patient's thorax, combining traction with steadying him against lateral strains. In elderly patients the traction has to be mitigated; one assistant then suffices.

**Manipulator's Posture.**—The position of his feet controls that of his body. The most comfortable stance is with one thigh medially, and the other laterally, rotated so that purchase is taken with the outer midtarsal area of one foot and the inner midtarsal area of the other, held against the legs of the couch. Stout shoes prevent the feet being hurt.

**Technique.**—The manipulator's hands grasp mandible and occiput as shown, and the patient is asked to let him take the weight of the head. The manipulator's body-weight is now used for traction, which can be increased by his extending both knees, or still further increased by his flexing one knee and pressing it against the leg of the couch. When the manipulator feels the patient's neck muscles relax and that good traction has been secured—this may take 2 to 10 seconds—the manipulation is attempted.

**Result.**—Traction of the order of 300 lbs. is obtained by me in this way. Several experienced staff physiotherapists have reached 200 lbs. when tested against a spring balance. X-ray photography before and during manual traction of the order of 100 lbs. has shown that the distance between the upper border of the first thoracic and the upper border of the fourth cervical vertebra increases from 7 to 8 cm. during traction (P. Flood). This amounts to 2·5 mm. distraction at each joint, which clearly provides an effective increase of the space within which the loose fragment has to move.





PLATE 11

## PLATE 11

## NECK: CIRCUMDUCTION DURING TRACTION

### FIRST MANIPULATION FOR ATTEMPTING REDUCTION OF INTRA-ARTICULAR DISPLACEMENT

**Nature of the Lesion.**—Protrusion of part of the intervertebral disc. A fragment of the cartilaginous disc becomes displaced, most often at the sixth cervical joint, but occasionally at the second, third, fourth, fifth or seventh joint. Protrusion of the pulpy nucleus is uncommon, but when it does occur attempted manipulative reduction must be undertaken either with great care or not at all.

**Frequency.**—Minor degrees of displacement are very much more frequent than has hitherto been supposed. They provide the common cause for pain felt in the neck and scapular area. Major displacements are the usual cause of what has hitherto been misnamed "brachial neuritis."

**Indication for First Manipulation.**—Displacement of part of the annulus fibrosus requiring reduction. No attempt should be made unless the manipulator has at least half an hour before him to devote to the patient.

**Anæsthesia.**—General anæsthesia is contra-indicated. It is easy to do harm unless the patient is conscious and able to help the manipulator by informing him, step by step, of the result of each manipulative attempt. Local anæsthesia has no place in treatment. By contrast, deep massage to that part of the semispinalis capitis muscle overlying the affected joint (see Plate 4) often greatly assists manipulative reduction carried out immediately afterwards. Hence, in resistant cases, this preliminary is well worth a trial. Presumably the friction alters the tone of the muscle, spasm of which hinders the manipulator by limiting movement at the affected joint. Another adjuvant method is neck-suspension (see Plate 16).

**Patient's Posture.**—The patient lies face upwards on the couch; her feet are held by one or two assistants, depending

result (or lack of result) of this first manipulation. At the same time, the manipulator judges the effect on the range of movement. If any benefit accrues, the same manœuvre should be repeated up to, say, six times, the patient sitting up for re-assessment of the result at the end of each attempt. If symptoms persist, he should pass on to the second manipulation (see Plate 12) unless the patient has stood as much as she can already, or her muscles have become too tense for any more to be done that day.

**Cautions.**—(1) If the patient feels the slightest increase in the brachial pain or even twinges in her arm, manipulation must stop at once. The same applies if she feels a discomfort in the upper limb not previously present. An increase in the cervical pain during the manipulation is naturally to be expected and, unless very severe, need cause no concern.

(2) Pulpy protrusions do not respond well to manipulation. They recede slowly during measures for gradual reduction (see Plates 16 and 17); they cannot be clicked back into place like fragments of cartilage.

(3) Cases occur of pressure on the spinal cord from cervical protrusions. Complete neurological examination of both upper and lower limbs must thus be undertaken before manipulation can safely be attempted. It is earnestly to be hoped that physiotherapists, bone-setters and osteopaths will employ these simple and effective methods only in cases selected by doctors as suited to this type of treatment. Most cases can be safely dealt with by manipulation; some others emphatically cannot—and disasters due to lack of appreciation of this fact are certainly encountered.

on the manipulator's strength. If no assistant is to hand, a short couch over the end of which the patient bends her knees allows her calves to supply counter-traction. If she wears dentures, she must remove them and bite on a thick pad of folded lint. Her shoulders should lie level with the end of the couch, thus enabling the neck to extend well. This is essential; for the manipulations are all carried out with the neck held more or less in extension. If any degree of flexion is permitted, further protrusion is encouraged by the manipulation. Muscular relaxation and the patient's confidence are maintained throughout by the manipulator, who never ceases to support the patient's occiput with one or other of his hands, and bids her relax when necessary.

**Technique.**—It is vital to keep up the greatest possible traction throughout all these manipulations. This is essential; and neglect of this injunction has led to disasters. Cases have been seen by me in which manipulation with faulty technique has resulted in further protrusion with increased cervical deformity and the sudden development of severe brachial pain.

The manipulator stands at the patient's head, with one or both feet firmly planted against the couch. One of his hands is hooked under her mandible and traction here keeps her neck extended. Pressure on the trachea with the little finger must be avoided. His other hand grasps the lower occiput, supporting and pulling at the same time. Slow rotary movements, not approaching the full range, are now carried out during great traction. This enables the manipulator to get the feel of the patient's neck and to judge how she is going to stand the unavoidable discomfort. This gradual beginning also allays the patient's fears of sudden twists and agonizing pains. If she cannot stand this first movement, or cannot relax her neck muscles, or it becomes clear that a protrusion of the pulpy nucleus is present, manipulative treatment should be abandoned.

The circumduction during traction should be maintained for fifteen seconds; whereupon the tension is gradually released. Cracks will be felt when a neck is manipulated in this way whether there is any lesion present or not. The patient then sits up, moves her head about and assesses the

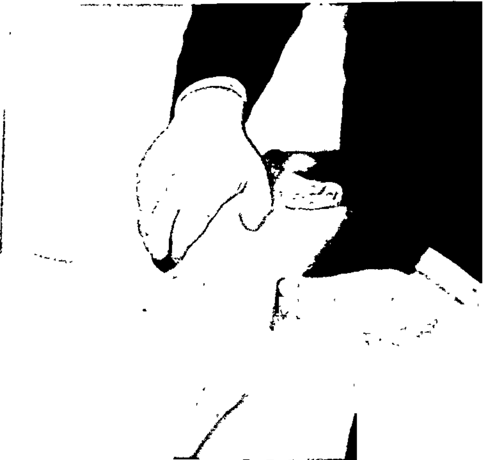


PLATE 12

## PLATE 12

## NECK: FULL ROTATION DURING TRACTION

### SECOND MANIPULATION FOR ATTEMPTED REDUCTION OF INTRA-ARTICULAR DISPLACEMENT

See general remarks at p. 70

**Indications for Second Manipulation.**—If the first manipulation (see Plate 11) has not brought any benefit, or has only partly succeeded, the second method follows at once.

**Patient's Posture.**—As described in the text facing Plate 11.

**Technique.**—If the head is to be turned to the right, the manipulator must apply his right hand to the patient's left cheek, so that he can apply pressure on her maxilla with his thenar eminence. His fingers are hooked about the left side of the mandible; by applying traction here, the head is extended at the same time as the cervical joints are distracted. The manipulator's left hand grasps and pulls upon her occiput.

During great traction, rotary movement to the right is forced gently, at first without any attempt at achieving full range. Experience enables the manipulator to feel if an impediment to the movement is present and whether or not it is likely to shift when the full range of movement is finally forced. This attempt is made once only; whereupon the traction ceases and the patient sits up and judges the degree, if any, of relief from pain while the manipulator assesses any changes in the range of movement. If necessary, the same movement is repeated, or it may be performed in the opposite direction, and the results observed again.

If symptoms persist, the third manipulation (Plate 13) follows.



PLATE 13

## PLATE 13

## NECK: SIDE-FLEXION DURING TRACTION

### THIRD MANIPULATION FOR ATTEMPTED REDUCTION OF INTRA-ARTICULAR DISPLACEMENT

See general remarks at p. 70

**Indications for Third Manipulation.**—If the first two manipulations have improved the position of the loose fragment, but have not succeeded in restoring full and painless side-flexion to the neck, this method is indicated. It is difficult to carry out and, imperfectly performed, is not free from the risk of increasing the degree of intra-articular subluxation; hence the indication and technique must be strictly observed.

If the first two manipulations have brought no benefit, it is unwise to proceed to this manipulation.

**Patient's Posture.**—The patient lies face upwards, her shoulders level with the edge of the couch. If lateral flexion is to be forced towards the right, an assistant applies counter-traction at her left shoulder.

**Technique.**—Assuming that side-flexion is to be forced towards the right, the manipulator stands at the patient's right shoulder. He has to perform three tasks with two hands; for this reason he must use his forearm applied to the postero-inferior aspect of the patient's parietal region to force the side-flexion movement. Traction is maintained by the manipulator's left hand hooked under the patient's mandible. The base of his right index finger applies counter-pressure against the mid-cervical transverse processes, and by curving over the fingers of this hand under her occiput he is able to support the patient's head and pull at the same time. His left forearm, pressing against the lower parieto-occipital area, forces side-flexion while both hands continue to apply firm traction. The manipulator's forearm is brought into action by a movement of his trunk, which is simultaneously rotated and bent sideways to the right. This draws his left arm

and forearm backwards and medially, enabling traction to be fully maintained.

This manipulation cannot be performed safely on a slippery floor ; the floor must be carpeted.

This manipulation should be carried out once only, and the result immediately assessed when the patient sits up. It may then be repeated in the same or the opposite direction, but should not be performed again and again, as in the case of the first and second methods.

If slight symptoms persist, final adjustment is obtained by employing the method depicted in Plate 15.

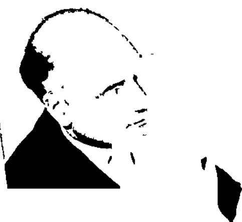




PLATE 14

## PLATE 14

## NECK: FORCED ANTERO-POSTERIOR GLIDING MOVEMENT

### FOURTH MANIPULATION FOR ATTEMPTED REDUCTION OF INTRA-ARTICULAR DISPLACEMENT

See general remarks at p. 70

**Indications for Fourth Manipulation.**—This manipulation should be adopted if considerable limitation of the range of extension at the neck remains after the first two manipulations have been carried out with increasing degrees of extension during traction.

**Patient's Posture.**—The patient lies face upwards, his shoulders level with the end of the couch. One assistant suffices to hold his feet, for really strong traction cannot be exerted.

**Manipulator's Posture.**—The outer side of one of the manipulator's knees presses against the leg of the couch. The hand at the occiput is used both to support the patient's head and, as he leans backwards, to apply traction to the patient's neck.

**Technique.**—The patient's upper lip bears the brunt of this manipulation. Since this is a tender area in everyone, a layer of sponge rubber is interposed between the patient's mouth and the palm of the manipulator's hand. While his one hand at the occiput maintains traction and the position of the patient's head, strong downward pressure is exerted by means of his other hand on the mouth. In this way, during traction, a backward gliding is induced of each cervical vertebra on the other. The pressure may be carried out several times, and continued until the range of extension at the cervical joints has, if possible, been fully restored.

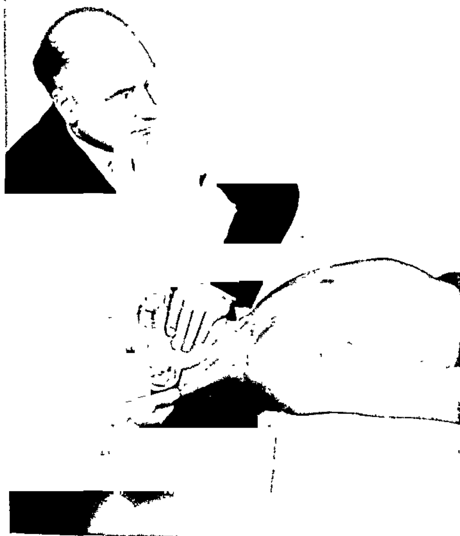


PLATE 14

## PLATE 15

## NECK: FORCED LATERAL GLIDING MOVEMENT

### FIFTH MANIPULATION FOR ATTEMPTED REDUCTION OF INTRA-ARTICULAR DISPLACEMENT

See general remarks at p. 70

**Indications for Fifth Manipulation.**—When reduction is almost complete, but a fine adjustment remains to be made, this manipulation is very useful. It is barely uncomfortable, never dangerous, and may thus be repeated any number of times.

**Patient's Posture.**—The patient lies face upwards on the couch with her shoulders level with the edge. An assistant holds the patient's trunk still by grasping her far arm and pulling until her near arm is pressed against the assistant's thighs.

**Technique.**—The movement to be carried out is a pure lateral gliding of one vertebra on the other, while the head retains its vertical relationship to the trunk. The manipulator stands at the patient's head supporting it in both hands. His thenar eminences apply alternating pressure to left and to right, while his thumbs, aligned on her mandible, keep her head in line with her body by preventing any side-flexion of the head. The patient must relax well, but she should not find this difficult; for the manipulation is virtually painless.

**Results of these Five Manipulations.**—Nine out of ten cervical intra-articular displacements can be reduced by means of these manipulations. One session lasting not more than half an hour may suffice in the case of a minor subluxation, at the most three or four such treatments given daily suffice. Pain felt in the upper limb naturally implies a greater degree of displacement; in such a case two or three weeks' treatment may be required.

Not all physiotherapists have the requisite strength and body-weight for applying adequate traction while forcing a



PLATE 15

movement; others may not care for this type of work. Hence subluxation within a cervical joint should not be regarded as incapable of reduction unless it is clear that the manipulations have been properly carried out. However, those few patients who have not recovered after, say, six *adequate* sessions must be regarded as having a protrusion irreducible by manipulation.

**Alternative Methods of Treatment.**—An attempt at manipulative reduction under anæsthesia, performed because manipulation without anæsthesia has failed, nearly always fails too. Hence gradual methods hold out a better prospect of success, and continuous traction in recumbency (see Plate 17) for seven to fourteen days is then indicated. Should this also fail, and if the symptoms are so severe that awaiting spontaneous recovery is out of the question, operation should be undertaken. Moreover, if signs of an upper-motor neurone lesion appear, operation is called for immediately. In my experience laminectomy is required in no more than 1 per cent. of all cases of cervical protrusion—a far lower figure than the minimum for lumbar intervertebral herniations.

## PLATE 16

### APPARATUS FOR HEAD-SUSPENSION

**Indications for Head-Suspension.**—Any patient with an intra-articular cervical subluxation may be submitted to head-suspension before the attempts at manipulative reduction (see Plates 10-15) are carried out. This is particularly called for in the case of a large man with a good deal of limitation of movement. Patients with a pulpy protrusion, in whom manipulation either is contra-indicated or has been tried without success, may have a displacement reducible by gradual measures only. In such cases the deformity may be extreme and daily treatment may be required for four, even eight, weeks.

**Contra-indications.**—Advanced cervical osteo-arthritis, old age, high blood-pressure and obesity suggest that suspension should be attempted with great caution or not at all.

**Patient's Posture.**—The patient sits on a stool with a small cushion under his thighs. His feet remain on the ground throughout. If these two precautions are observed no harm can well come of head-suspension ; for, if the cord breaks, he merely falls an inch or so back on to the cushion and, if the pain becomes unexpectedly severe, he can at any moment rise to his feet instantly.

**Technique.**—By adjustment of the length of the occipital strap, the collar is so arranged that the anterior portion clears the trachea while supporting the mandible. When the strain is taken on the cord, the patient's head must be found held in slight extension ; if not, the straps have been sewn on to the collar in the wrong place or at the wrong angle.

The physiotherapist stands by the patient, observing his expression. She pulls gradually on the cord until the patient's buttocks are just clear of the stool and holds him there for as long as he can bear, *i.e.* one to five minutes as a rule, but the longer the better. *When the patient indicates that he has had* enough, she lets him down again equally slowly. Letting a



PLATE 16

patient down too quickly may set up severe pain. After a minute or two's interval he is suspended once again for as long as he can bear. If he is to be manipulated afterwards, ten or fifteen minutes should be spent thus ; if suspension forms the whole treatment, up to half an hour.

**Results.**—Suspension is seldom called for alone, since it is essentially a preliminary to manipulation. It is the method of choice only when other measures are impracticable or dangerous, usually because the protrusion is pulpy and not cartilaginous. In these difficult cases treatment may be required for one to two months.

## PLATE 17

## CONTINUOUS TRACTION IN RECUMBENCY

**Indications.**—1. Marked postero-lateral protrusion of the pulpy nucleus at a cervical spinal joint. If attempted reduction by other means has failed, and the symptoms warrant it, treatment by continuous traction should be instituted at once. The common indication is thus severe pain in the upper limb resulting from a pulpy protrusion pressing on a cervical nerve-root (*i.e.* what used to be called " brachial neuritis "). Pulpy protrusions cannot be reduced by manipulation, but the symptoms they cause are often too pronounced for the patient to be able to bear waiting for several months pending spontaneous cure.

2. The earliest stage of central protrusion of a part of a cervical intervertebral disc. In these rare cases the patient may merely experience paræsthesiæ in his limbs on neck-flexion, signs of pressure on the spinal cord not yet having appeared. Reduction is an urgent necessity, but manipulation is dangerous and the patient naturally wishes to avoid laminectomy for what appears to him (quite wrongly) a trivial symptom.

**Contra-indication.**—Cartilaginous displacements within a cervical spinal joint. Naturally, if the protruded fragment is cartilaginous, manipulative reduction is as quick and easy as traction in recumbency is slow and troublesome. Not only that, but continuous traction may not succeed in bringing about reduction. Thus, I have more than once reduced a displaced fragment of *cartilage* by one manipulation after continuous traction (carried out elsewhere) had failed.

**Technique.**—The head of the bed is raised on 12-inch blocks and a pulley is screwed to the bedrail. A leather collar (the same as that used for head-suspension—see Plate 16) is strapped loosely under the patient's chin and occiput. Strips of sponge rubber ½ inch thick are inserted between the mandible and the leather. The straps on the collar are attached to a special spreader 22 inches wide. The extra width ensures that the straps clear the patient's ears, which soon become

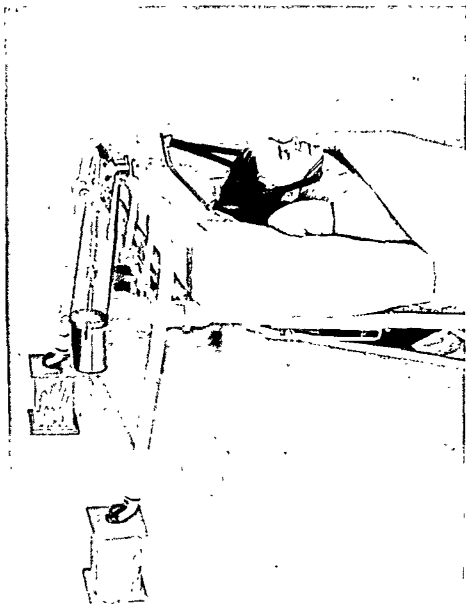


PLATE 17

painfully squeezed if an ordinary 12-inch spreader is used. The weight hangs by a cord passing over the pulley to the centre of the spreader. Ten to 12 lbs. are usually required by day, 5 to 8 lbs. by night. The patient is kept under morphia for the first day or two—*i.e.* until the severe brachial pain has abated.

**Patient's posture.**—The patient's neck must not be allowed to flex; hence the back of the head lies directly on the mattress, a small folded towel supporting the nape of the neck. The straps and cord run roughly parallel with the mattress, and care must be taken, day and night, that the patient does not slip up the bed far enough for the spreader to catch against the bedrail. The patient may rotate her head whenever she likes. She requires full nursing: feeding, washing, bed-pan, etc.

**Progress.**—Once the pain in the scapular area and upper limb has wholly ceased the weight is diminished; finally it is removed for, say, half an hour at a time. If nothing untoward happens the weight is left off for longer periods by day, a small weight (*e.g.* 4 lbs.) being retained for a further few nights, since it is during sleep that the neck may inadvertently assume a bad position. In due course the patient tries sitting up for a few minutes at a time; these periods are then lengthened, provided that the pain remains absent.

**Result.**—The patient may expect to leave hospital, pain free, in seven to twelve days. The weakness of the affected muscles does not recover for several months; hence heavy tasks will have to be avoided for a time.

Failure to achieve reduction is most uncommon in pulpy protrusions; but should failure occur, laminectomy may have to be considered.

**After-treatment.**—Often none is required. However, the patient must be warned that recurrence is a real possibility and that she must report any return of pain at once. Repeated displacement may call for the maintenance of reduction by means of a moulded leather collar.

painfully squeezed if an ordinary 12-inch spreader is used. The weight hangs by a cord passing over the pulley to the centre of the spreader. Ten to 12 lbs. are usually required by day, 5 to 8 lbs. by night. The patient is kept under morphia for the first day or two—*i.e.* until the severe brachial pain has abated.

**Patient's posture.**—The patient's neck must not be allowed to flex; hence the back of the head lies directly on the mattress, a small folded towel supporting the nape of the neck. The straps and cord run roughly parallel with the mattress, and care must be taken, day and night, that the patient does not slip up the bed far enough for the spreader to catch against the bedrail. The patient may rotate her head whenever she likes. She requires full nursing: feeding, washing, bed-pan, etc.

**Progress.**—Once the pain in the scapular area and upper limb has wholly ceased the weight is diminished; finally it is removed for, say, half an hour at a time. If nothing untoward happens the weight is left off for longer periods by day, a small weight (*e.g.* 4 lbs.) being retained for a further few nights, since it is during sleep that the neck may inadvertently assume a bad position. In due course the patient tries sitting up for a few minutes at a time; these periods are then lengthened, provided that the pain remains absent.

**Result.**—The patient may expect to leave hospital, pain free, in seven to twelve days. The weakness of the affected muscles does not recover for several months; hence heavy tasks will have to be avoided for a time.

Failure to achieve reduction is most uncommon in pulpy protrusions; but should failure occur, laminectomy may have to be considered.

**After-treatment.**—Often none is required. However, the patient must be warned that recurrence is a real possibility and that she must report any return of pain at once. Repeated displacement may call for the maintenance of reduction by means of a moulded leather collar.



PLATE 18

## PLATE 18

## LEVATOR SCAPULÆ MUSCLE: FIBRES AT SCAPULAR INSERTION

**Site of Lesion.**—The lower end of the belly of the muscle may be affected, but it is the actual fibres of insertion at the scapula which are the usual source of pain. Strain due to overuse occurs in patients who cannot voluntarily elevate the arm fully, whether from actual stiffness at the shoulder-joint or from lesions of the abductor or serratus anterior muscles.

**Frequency.**—Uncommon.

**Patient's Posture.**—The patient lies prone, the arm on the side to be treated hanging limply over the edge of the couch so as to pull the scapula as far outwards as possible.

**Technique.**—The physiotherapist sits at the patient's head. She identifies the upper and inner angle of the scapula and asks the patient fully to relax the vertebro-scapular muscles. She lays the tip of her middle finger, reinforced by the index, against the edge of the bone and presses slightly forwards but mainly outwards against it. In this way the fibres of insertion of the muscle are caught between her finger and the bone. The friction is imparted by a to-and-fro movement horizontally of the physiotherapist's forearm.

**Duration of Treatment.**—This varies. About two-thirds of the patients need no more than two to four weeks' treatment, given two or three times a week. Others take longer. A few prove intractable.

**Results.**—Usually very good.



PLATE 19

## PLATE 19

## SERRATUS ANTERIOR MUSCLE: SCAPULAR INSERTION

**Site of Lesion.**—Strain appears to occur only at the fibres of insertion at the deep aspect of the inner border of the scapula. Rarely one or other of the digitations on the lateral aspect of the thoracic wall is injured by direct violence.

**Frequency.**—Rare.

**Patient's Posture.**—The patient lies on his affected side, the lower shoulder and arm pressed backwards by his body weight. He carries his forearm behind his back so as to rotate the arm medially; this brings the vertebral edge of the scapula away from the chest wall.

**Technique.**—The physiotherapist stands at the patient's head, facing his feet. She grasps the edge of the scapula, her thumb applied to the anterior aspect of the vertebral border of the bone at the site of the lesion. Her fingers supply counter-pressure at the dorsum of the scapula. The friction is imparted by a to-and-fro movement of her thumb along the insertion of the serratus muscle. The thumb movement is an adduction-abduction one. As with all pure thumb movements, massage carried out in this way is very tiring, but other techniques are apt to prove ineffective.

**Duration of Treatment.**—Ten minutes' friction, ten minutes' rest and another ten minutes' friction are probably as much as can be expected. Treatment may be required twice a week for three to six weeks.

**Results.**—Most, but not all, cases are fully relieved. If this result is not achieved at the end of six weeks the patient should be referred back to his doctor, for this muscle is one of those that may respond well to therapeutic local anæsthesia.



PLATE 20

## PLATE 20

## LATISSIMUS DORSI AND TERES MAJOR MUSCLES

**Site of Lesion.**—The lesion is always traumatic, minor tears occurring during forcible active backward or inward movements of the arm. The outer edge of the muscles just below the axilla is the usual source of pain.

**Frequency.**—Uncommon.

**Patient's Posture.**—The patient lies prone, his arms abducted and the forearms flat on the couch above his head. This position brings the muscles into prominence without stretching them too much.

**Technique.**—The physiotherapist sits by his waist. She grasps the affected area of muscle between her thumb and the tips of her fingers. The friction is imparted by her drawing her whole hand towards herself while maintaining this grip.

**Duration of Treatment.**—Two to four weeks of treatment twice weekly are generally enough.

**Results.**—Uniformly good. Since this is one of the muscles which responds well to therapeutic local anæsthesia, the patient should be referred back to his doctor if he is at all slow in his response to massage.



PLATE 21

## PLATE 21

### PECTORALIS MAJOR MUSCLE: OUTER EDGE

**Site of Lesion.**—This is traumatic, as a rule the result of an overstrain during heavy lifting, sometimes directly from a blow. Repeated stresses, *e.g.* in carrying a baby, may be responsible. The common site is that shown in the illustration. The other fibres that may be affected are those lying just below the outer half of the clavicle (not illustrated).

**Frequency.**—Uncommon.

**Indication for Massage.**—Scarring here.

**Patient's Posture.**—The patient adopts the half-lying position on the couch. He abducts his arm somewhat so as to bring the muscle into prominence; his forearm may suitably rest across the physiotherapist's lap.

**Technique.**—The physiotherapist sits by his side, facing him. She grasps the edge of the muscle, which would otherwise be apt to move as a whole with the physiotherapist's hand. By maintaining her grip and pulling her hand bodily towards herself, she imparts the required friction.

***Duration of Treatment.**—This should last about twenty* minutes. More than two to four weeks' treatment on alternate days is seldom required.

**Results.**—Uniformly good. Since the pectoralis major muscle is one of the few responding well to the induction of therapeutic local anæsthesia, the patient should be referred back to his doctor if he does not recover quickly.



PLATE 22

## PLATE 22

### STERNO-CLAVICULAR JOINT

**Nature of Lesion.**—Traumatic arthritis, often with permanent capsular laxity, may follow a fall on the shoulder. Osteo-arthritis with destruction of the joint and subluxation occurs apparently spontaneously.

**Frequency.**—Uncommon.

**Indication for Massage.**—Recent traumatic lesions are not treated by massage, which should be reserved for cases in which symptoms persist for longer than a fortnight. Osteo-arthritis should also be treated by massage to the capsule.

**Patient's Posture.**—The patient adopts the half-lying position on the couch.

**Technique.**—The physiotherapist sits facing the patient. She places the middle finger, reinforced if necessary by the index, on the joint capsule and applies her friction with a vertical sweep. Exercises afterwards are avoided.

**Duration of Treatment.**—In traumatic cases, two to six weeks' treatment, lasting fifteen minutes twice weekly, usually suffices. Osteo-arthritis requires at least two months' treatment.

**Results.**—In traumatic cases these are nearly always good. In osteo-arthritis, a good deal of relief may be secured, but sooner or later the symptoms are apt to recur. In some cases the improvement is slight and transitory.



PLATE 23

## PLATE 23

## ACROMIO-CLAVICULAR JOINT

**Nature of Lesion.**—This is nearly always traumatic. Osteo-arthritis of unexplained onset is a common radiological finding, but a most uncommon cause of symptoms. If an injury results in capsular laxity and a tendency to subluxation, these persist, but do not necessarily cause pain.

**Frequency.**—Fairly common.

**Indication for Massage.**—Trauma to the joint followed by persistent symptoms. Osteo-arthritis causing pain.

**Patient's Posture.**—The patient adopts the half-lying or sitting position.

**Technique.**—The physiotherapist stands behind him at his shoulder. She presses one finger on the joint and gives her friction by a horizontal to-and-fro movement of the whole hand in the sagittal plane. Exercises afterwards are to be avoided.

**Duration of Treatment.**—Fifteen minutes' massage, two or three times a week for two to six weeks, usually suffice.

**Results.**—Full lasting relief is usually attained, even in cases in which a tendency to subluxation of the joint persists.



PLATE 24

## PLATE 24

## SUBDELTOID BURSA

**Nature of Lesion.**—In youngish patients subdeltoid bursitis nearly always starts as a mild localized lesion following trauma, only rarely with effusion. Bursitis may also appear spontaneously, with or without calcification, usually in middle-aged women. Unprovoked hæmorrhage into the bursa is an uncommon event, apparently occurring only in the elderly.

**Frequency.**—Uncommon.

**Indication for Massage.**—Recent traumatic bursitis still within the stage—as indicated by the symptoms—when active treatment can be attempted with safety.

**Contra-indications.**—Acute or subacute bursitis. Bursitis with clear effusion or hæmorrhage into the bursa. Bursitis with calcification. In long-standing bursitis, massage to the bursa followed by forcing movement is less effective than exercises carried out during local anæsthesia of the bursa.

**Patient's Posture.**—The patient sits with his arm held close to his side and in slight lateral rotation. Unless the arm is kept adducted, the greater part of the bursa lies out of reach under the acromion.

**Technique.**—The physiotherapist sits facing the patient and places her thumb on the affected part of the bursa. Her fingers supply counter-pressure at the back of the shoulder. The friction, which should always be gentle, is imparted by alternate abduction and adduction movements of the thumb. Since the bursa is not a striated structure, the direction in which the friction is given is immaterial.

**Duration of Treatment.**—The massage should last about thirty minutes. In recent localized traumatic bursitis, treatment seldom has to be continued on alternate days for more than two or three weeks. The massage is followed by gentle passive movement at the shoulder joint in each direction.

At each visit the physiotherapist must enquire for a change in the degree of pain and estimate the range of abduction.

**Results.**—In suitable cases, the response to massage is almost immediate. In unsuitable cases, friction does harm.

**Caution.**—The subdeltoid bursa is a difficult structure to deal with at all times. Any increase in pain or diminution in the range of movement must be taken seriously and the patient referred back to his doctor the same day. Only thus may severe bursitis, which may develop in spite of treatment, be prevented. Hence the physiotherapist should not hesitate to refer patients back to the doctor for further advice if they do not respond almost at once.



PLATE 25

## PLATE 25

### SUPRASPINATUS TENDON

**Nature of Lesion.**—Most often tendinitis here is due to overuse, but it may follow a single injury. Small areas of calcification in the tendon are usually symptomless. The mere fact of their being discovered by X-ray examination does not imply the existence of a clinical tendinitis.

**Frequency.**—Common.

**Indication for Massage.**—Tendinitis, whether associated or not with a calcified node. Massage to the tender remnants of the tendon at the greater tuberosity is also required when a painful arc persists after complete rupture of the supraspinatus tendon.

**Contra-indication.**—A large area of calcification in the tendon.

**Patient's Posture.**—It is vital to get the patient into exactly the right position; otherwise the tendon lies wholly out of reach. The patient adopts the half-lying position on the couch, his shoulder projecting well beyond its edge and his arm hanging limply. The force of gravity brings the arm into the position of extension.

**Technique.**—The physiotherapist sits facing his head and presses her knee against his forearm so as fully to adduct the limb. The position of extension brings the tendon forwards in front of the acromion; the position of adduction now draws the distal extremity outwards beyond the acromion. The tendon now lies well in front of, and just lateral to, the anterior extremity of the acromion process. The physiotherapist identifies both this point and the greater tuberosity of the humerus. In the groove palpable between the two bones the tendon of the supraspinatus muscle can be clearly palpated. The friction is given by the tip of the physiotherapist's middle finger, reinforced by the index. Depending on individual variation in the configuration of the bones and on the degree of extension and adduction obtainable at the shoulder joint,



PLATE 25

## PLATE 25

## SUPRASPINATUS TENDON

**Nature of Lesion.**—Most often tendinitis here is due to overuse, but it may follow a single injury. Small areas of calcification in the tendon are usually symptomless. The mere fact of their being discovered by X-ray examination does not imply the existence of a clinical tendinitis.

**Frequency.**—Common.

**Indication for Massage.**—Tendinitis, whether associated or not with a calcified node. Massage to the tender remnants of the tendon at the greater tuberosity is also required when a painful arc persists after complete rupture of the supraspinatus tendon.

**Contra-indication.**—A large area of calcification in the tendon.

**Patient's Posture.**—It is vital to get the patient into exactly the right position; otherwise the tendon lies wholly out of reach. The patient adopts the half-lying position on the couch, his shoulder projecting well beyond its edge and his arm hanging limply. The force of gravity brings the arm into the position of extension.

**Technique.**—The physiotherapist sits facing his head and presses her knee against his forearm so as fully to adduct the limb. The position of extension brings the tendon forwards in front of the acromion; the position of adduction now draws the distal extremity outwards beyond the acromion. The tendon now lies well in front of, and just lateral to, the anterior extremity of the acromion process. The physiotherapist identifies both this point and the greater tuberosity of the humerus. In the groove palpable between the two bones the tendon of the supraspinatus muscle can be clearly palpated. The friction is given by the tip of the physiotherapist's middle finger, reinforced by the index. Depending on individual variation in the configuration of the bones and on the degree of extension and adduction obtainable at the shoulder joint,

the physiotherapist varies the angle of her hand so that a horizontal transverse friction is imparted to the tendon between the two bony points. In this case the massage must be sited correctly to within a quarter of an inch; otherwise it is useless.

**Duration of Treatment.**—About a quarter of an hour's friction twice weekly suffices. Two to six weeks' treatment is required as a rule.

**Results.**—No matter how long-standing the tendinitis, few patients fail to get well in two months; the average period has been one month. An occasional case of relapse *after resumption of heavy work is encountered.*

**Caution.**—The tissues overlying the bony tuberosity are more tender than the adjacent supraspinatus tendon itself, *even when tendinitis is present.* If, therefore, the physiotherapist applies her finger to the most tender area instead of to the site of the tendon, as identified by palpation, her treatment will be directed to the wrong spot.

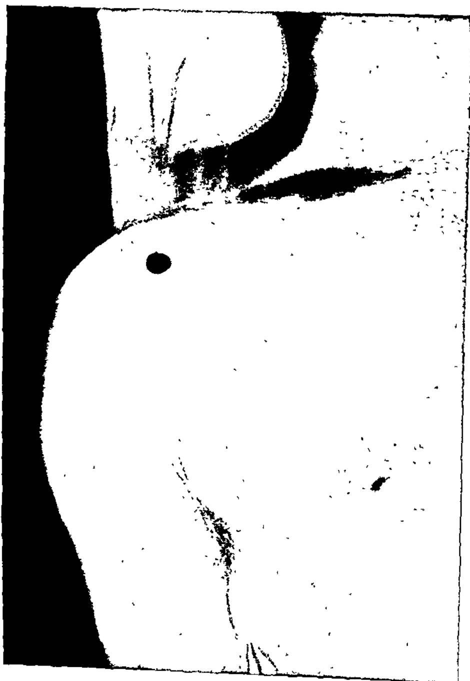


PLATE 25a

## PLATE 25a

The position of the supraspinatus tendon is shewn—*just medial* to the greater tuberosity of the humerus.



PLATE 26

## PLATE 26

## SUPRASPINATUS MUSCLE: MUSCULO-TENDINOUS JUNCTION

**Nature of Lesion.**—This is either traumatic or due to prolonged overuse. Lesions of the belly itself are very rare.

**Frequency.**—Rare.

**Patient's Posture.**—The patient sits with his arm held in passive abduction by support at the elbow. This relaxes the belly of the supraspinatus muscle and brings the affected part within reach.

**Technique.**—The physiotherapist stands by the patient's unaffected shoulder with her forearm passing behind his neck. She presses the front of her middle finger tip, reinforced by the index, deeply into the angle formed by the spine of the scapula and the back of the outer part of the clavicle. She imparts the transverse friction by keeping her finger at this spot and rotating the forearm to and fro by alternate supination and pronation movements.

**Duration of Treatment.**—A quarter of an hour's friction thrice weekly.

**Results.**—All the cases seen so far have cleared up with two or three weeks of such massage.

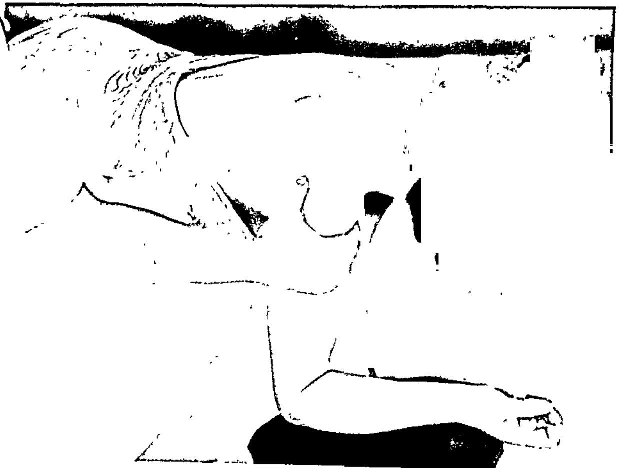


PLATE 27

## PLATE 27

## INFRASPINATUS TENDON

**Site of Lesion.**—The tendinous strain occurs close to, or at, the insertion at the greater tuberosity of the humerus.

**Frequency.**—Uncommon.

**Indication for Massage.**—Tendinitis.

**Patient's Posture.**—The patient lies face downwards, his shoulder projecting well over the edge of the couch. His arm hangs down and the forearm is supported on a cushion. This support is important ; for it secures adduction at the shoulder joint by preventing the scapula from sliding too far round the chest wall. The adduction brings the humeral tuberosity out from under the acromion, then the combined flexion and lateral rotation bring the tuberosity backwards. The infraspinatus tendon can now be felt crossing the head of the humerus just below the posterior aspect of the acromion.

**Technique.**—This technique was evolved by Mrs. P. Skillern, staff-physiotherapist at St. Thomas's Hospital. The physiotherapist sits facing the patient's head and places her fingers in front of his shoulder. She feels for the tendon with her thumb and flexes it until good pressure is obtained. Alternate abduction and adduction of the thumb draws it to and fro across the tendon. At the extreme of the adduction movement, she feels the tip of her thumb engage against the posterior acromial edge.

**Duration of Treatment.**—Twenty minutes two or three times a week.

**Results.**—The main difficulty is to ensure that the massage is given to the exact spot in the tendon where the strained fibres lie. When this is found, some six or eight sessions of massage suffice to bring about recovery. Since, however, there is about an inch of latitude in the placing of the operative finger, the physiotherapist cannot avoid occasionally making a false start slightly to one or other side of the lesion. The physician cannot help to direct her finger within this limit ; hence allowances must be made for some trial and error during the first few sessions.



PLATE 28

## PLATE 28

## SUBSCAPULARIS TENDON

**Site of Lesion.**—Injury may cause a teno-periosteal tear akin to the common variety of tennis-elbow. It may follow a single overstrain, say, at heavy lifting ; or it may be due to overuse.

**Frequency.**—Uncommon.

**Indication for Massage.**—Non-specific tendinitis.

**Patient's Posture.**—The patient adopts the *half-lying* position on the couch. He holds his arm close to his side and bends his elbow to a right-angle.

**Technique.**—The physiotherapist sits at the patient's side, facing him. She grasps his wrist and rotates the arm laterally, using his forearm as a lever. With the middle finger of her other hand, reinforced by the index, she identifies the edge of the deltoid muscle. By pressing deeply and pushing her finger laterally at the same time, she holds the deltoid muscle aside. By manœuvring the patient's forearm she arrives at that degree of lateral rotation in which she can *feel the lesser tuberosity and the subscapular tendon rising* under her finger as the arm is made to rotate a little. She steadies his forearm in this position, taking care that his elbow still lies against his side. The friction is imparted to the tendon by a vertical movement of the physiotherapist's finger.

**Duration of Treatment.**—Twenty minutes twice a week is enough. Massage here is trying both to the physiotherapist and to the patient. Treatment usually has to be continued for one or two months.

**Results.**—Not more than two-thirds of the patients are fully relieved by massage. Hence, if the patient is not much better at the end of *one month, or almost well at the end of two,* it is not worth while going on. No treatment known to me affects the speed of recovery in these intractable cases. The patient must await spontaneous cure, which usually takes a year.

**Caution.**—The subscapularis tendon should not be massaged through the thickness of the deltoid muscle.



PLATE 29

## PLATE 29

## SHOULDER-JOINT: FORCED ELEVATION

**Nature of Lesion.**—This is of two types:—(1) After an injury, direct or indirect, adhesions form about the capsule of the shoulder-joint just as at other sites. They differ, however, from post-traumatic adhesions at other joints; for they result in limitation of movement in *every* direction. When ruptured by manipulation, these adhesions are felt and heard to part as if they were thick bands, whereas at other joints adhesions give way in a manner suggesting more numerous and much slighter strands of tissue.

(2) Osteo-arthritic capsular contracture. This is the same as occurs in osteo-arthritis elsewhere. The existence of osteo-arthritis makes the joint very sensitive to mere overuse or a slight injury, traumatic arthritis supervening for minor causes; in such cases adhesions form about the already-contracted capsule of the joint and the two types of disorder are present together.

**Frequency.**—Quite common in patients over fifty; and in adults after any local trauma to bone or joint not treated by immediate movement.

**Indications for Manipulation.**—The presence of capsular adhesions limiting movement or causing pain, or of osteo-arthritic contracture of the capsule of the joint, in the *first* stage (as defined in *Rheumatism and Soft-Tissue Injuries*, p. 109). Freezing arthritis after the lapse of about eight months.

**Contra-indications.**—Either of these disorders in the third stage. Any stage of infective arthritis or of subdeltoid bursitis.

**Patient's Posture.**—The patient lies face upwards on the couch, the end of which is slightly raised. He brings his arm up as far as he can, keeping his hand in front of his forehead. This secures a certain amount of medial rotation, a movement which it is not safe to force strongly in any other way. This is important; for in the presence of thick adhesions, an endeavour directly to force rotation is far more likely to fracture

the shaft of the humerus than to rupture the adhesions limiting this movement.

**Technique.**—The physiotherapist must be ready to devote at least fifteen minutes daily to forcing the passive movement. Short-wave diathermy given *just* before the manipulation affords heat-analgesia and diminishes the patient's discomfort. Throughout the physiotherapist watches the patient's face and tries him as hard as, but not harder than, is reasonable.

Her one hand keeps the patient's thorax on the couch; otherwise he will eventually arch his back, thus appearing to achieve an increase in the degree of elevation of his arm. Her other hand presses against the patient's elbow, slowly forcing elevation at the shoulder; now slackening her effort enough to afford some respite, now increasing her pressure again. No jerk is given. Adduction may require some forcing as well; lateral and medial rotation are attempted only cautiously. In cases that have lasted some time, one day a crack is felt, after perhaps a week's forcing; from this moment the pain eases and the range of movement increases. Two or three such bands may require rupture before a full range of movement is restored to the joint.

**After-treatment.**—Exercises in every direction follow, in order that the patient may retain actively the added range of movement afforded him passively. They must be carried out in every direction several times daily.



PLATE 30

## PLATE 30

## BICEPS MUSCLE: TENDON OF LONG HEAD

**Site of Lesion.**—As elsewhere, tendinitis here is the result of overuse or of one severe strain, and usually affects the lower part of the tendon of the long head. The lesion always lies at the deep aspect of the muscle belly.

**Frequency.**—Uncommon.

**Indication for Massage.**—Non-specific tendinitis.

**Patient's Posture.**—The patient adopts the half-lying position on the couch, his arm by his side and held in slight lateral rotation.

**Technique.**—The physiotherapist sits at his side, facing him. She identifies the biceps tendon lying in the groove on the humerus, if necessary by feeling it become taut on an elbow-flexion movement resisted at his forearm. She presses her whole thumb flat on the tendon, applying counter-pressure by her fingers at the back of his arm. She gives the friction by adducting and abducting her thumb to and fro over the tendon.

**Duration of Treatment.**—Twenty minutes on alternate days.

**Results.**—In my experience every case of acute or chronic tendinitis here had fully recovered after two or three weeks' massage given in this way, even if the disorder has lasted many years.

**Caution.**—The lower part of the anterior edge of the deltoid muscle must not be mistaken for the tendon.

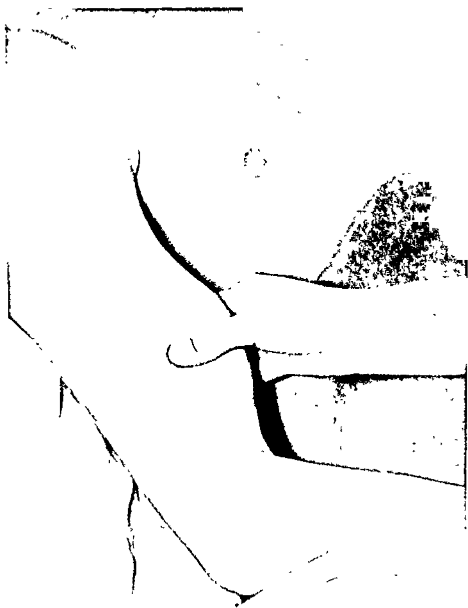


PLATE 31

## PLATE 31

## BICEPS MUSCLE OF ARM: MUSCULO-TENDINOUS JUNCTION

**Site of Lesion.**—This is nearly always at the lower musculo-tendinous junction and the result of a single excessive strain during, say, heavy lifting. Occasionally an overuse fibromyositis occurs from repetitive work involving repeated flexion movements at the elbow.

**Frequency.**—Uncommon.

**Indication for Massage.**—Recent or chronic fibromyositis.

**Patient's Posture.**—The patient adopts the half-lying position. His arm and forearm are supported by the couch, and the elbow is thus held in about 45 degrees of flexion.

**Technique.**—The physiotherapist sits facing him and grasps the affected area of muscle between her fingers and thumb. While maintaining this grip, she pulls her whole hand bodily towards herself, thereby imparting the friction.

**Duration of Treatment.**—This should last fifteen or twenty minutes. More than a few weeks' treatment on alternate days is seldom required except in very chronic cases.

**Results.**—Full relief is to be expected. Only very chronic cases, lasting five years or more, may prove intractable.



PLATE 32

## PLATE 32

## BICEPS TENDON: INSERTION AT RADIAL TUBEROSITY

**Site of Lesion.**—Strain at the teno-periosteal junction, *i.e.* between the lower tendon of the biceps muscle and the tuberosity of the radius.

**Frequency.**—Uncommon.

**Indication for Massage.**—Tendinitis.

**Patient's Posture.**—The patient adopts the half-lying position on the couch and places his fully supinated forearm across the physiotherapist's lap.

**Technique.**—This technique was elaborated by Miss F. Lee when she was one of our physiotherapy students. Until then I had regarded this lesion as incurable by physiotherapy, and had previously found that the only effective treatment was rest in a sling for up to three months. The photograph shows Miss Lee herself in action.

The physiotherapist sits at right angles to the patient, facing his forearm. She flexes her thumb at the interphalangeal joint so as to apply its tip to the radial tuberosity anteriorly. Counter-pressure is applied by her fingers at the back of his forearm. Friction is then imparted to the tendon at the tuberosity by means of the other hand which, grasping the patient's hand, alternately pronates and supinates his forearm. At each rotation, full supination should be achieved, but it is unnecessary to go further than half-pronation, for beyond this point the tuberosity will have swung out of reach of the operative thumb.

**Duration of Treatment.**—Twenty minutes two or three times a week.

**Results.**—Full relief is to be expected in two to six sessions.



PLATE 33

## PLATE 33

## TENNIS-ELBOW : LATERAL HUMERAL EPICONDYLE

(The term " tennis-elbow " is used to cover all non-specific lesions affecting the wrist-extensor group of muscles near the elbow.)

### MASSAGE TO FRONT OF LATERAL EPICONDYLE OF HUMERUS

**Frequency.**—Very common. In nine out of ten cases of tennis-elbow, the lesion lies at the teno-periosteal junction at the front of the lateral epicondyle.

**Indication.**—The common teno-periosteal variety of tennis-elbow. The friction both affords massage analgesia and thins out scar-tissue at this point. The massage is a most useful preliminary to manipulation ; *it has little or no virtue in itself.*

**Patient's Posture.**—The patient sits with his elbow bent to a right-angle and fully supinated. This brings the lateral epicondyle into prominence.

**Technique.** — The physiotherapist must find the right spot by using her knowledge of anatomy rather than by asking the patient ; for most places in this region are very tender in normal persons. In particular, pressure exerted from in front over the head of the radius is always painful. In the teno-periosteal variety of tennis-elbow the tear lies at the origin of the common extensor tendon from the bone, *i.e.* at the *front* of the lateral epicondyle. It is here, not to the apex of the epicondyle, that massage is required.

The physiotherapist sits facing the patient. With one hand at his wrist, she holds his forearm fully supinated. She then bends the distal joint of the thumb of her other hand to a right-angle and presses deeply on the front of his epicondyle. Counter-pressure is applied by the fingers lying against the inner side of his elbow. The thumb is used facing towards the olecranon. By an adduction-flexion movement of her thumb, combined with flexion of her fingers, her thumb imparts the friction to the tendon at this point.

**Duration of Treatment.**—Fifteen or twenty minutes suffice. Either (or both) of the manipulations illustrated in Plates 37 and 38 should follow immediately.

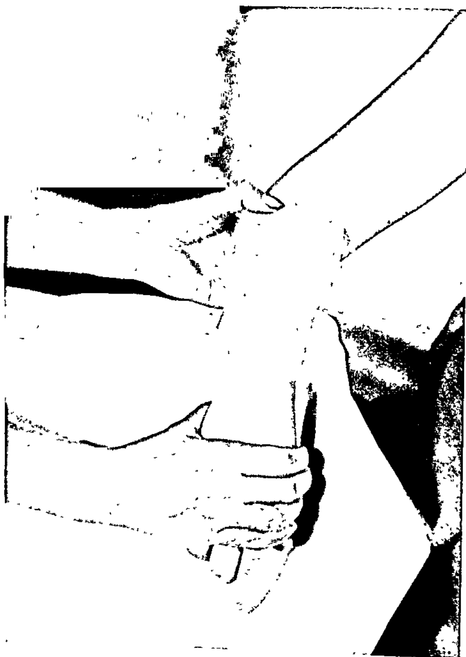


PLATE 34

## PLATE 34

### TENNIS-ELBOW: MUSCULO-TENDINOUS JUNCTION

**Frequency.**—Uncommon.

**Indication.**—Acute or chronic strain at the junction between the common tendon and the radial extensor bellies. The massage is the essential curative measure in this type of tennis-elbow; manipulation is valueless.

**Patient's Posture.**—The patient sits and holds his forearm in 45 degrees short of full extension and nearly full pronation at the elbow joint. The affected part of the muscle then overlies the head of the radius anteriorly.

**Technique.**—The physiotherapist sits facing the patient, holding his forearm in the above position by one hand at his wrist. She grasps the patient's forearm with the fingers and thumb of her other hand. With the flexed thumb she identifies the antero-medial edge of the muscles and finds the affected area. Tenderness here is universal and careful comparison of the two sides is therefore essential. The physiotherapist imparts the friction by drawing her thumb outwards by alternate flexion and extension movements of her wrist. By using the fingers as a fulcrum, her thumb catches the edge of the muscle; at each stroke this is felt to slip under her thumb.

**Duration of Treatment.** — Twenty minutes twice weekly suffices. Manipulations or exercises do not follow.

**Results.**—Three to six weeks' treatment usually affords lasting relief.



PLATE 35

## PLATE 35

## TENNIS-ELBOW: BELLY OF EXTENSOR MUSCLES IN UPPER FOREARM

**Site of Lesion.**—This is an overuse fibromyositis such as occurs in many other situations. The strain occurs at the upper part of the bellies of the extensor carpi radialis muscles, 1 to 1½ inches below the humeral epicondyle.

**Frequency.**—This is an uncommon type of tennis-elbow.

**Indication.**—Induction of local anæsthesia is the method of choice. Massage is indicated only when this treatment is not available.

**Patient's Posture.**—The patient sits with his arm supported horizontally. His elbow should be fully extended, and his forearm pronated.

**Technique.** — The physiotherapist stands at his elbow and holds the patient's hand extended so as to relax the extensor muscles. With her other hand she picks the muscle group up, her fingers grasping the muscles deeply. By maintaining this grip and drawing her hand vertically upwards she applies friction to the muscles. The fingers must not slip over on to the unaffected brachio-radialis muscle. The massage should be followed by exercises, not by manipulation.

**Duration of Treatment.**—The friction should be given for about twenty minutes.

**Results.**—Local anæsthesia, induced two or three times at weekly intervals, is the treatment of choice. It is so regularly successful that I have not had to use massage often enough to generalize about its results.



PLATE 35

## PLATE 36

### TENNIS-ELBOW: ORIGIN OF EXTENSOR CARPI RADIALIS LONGUS MUSCLE

**Frequency.**—Rare.

**Indication.**—Musculo-periosteal type of tennis-elbow. The massage is the essential curative measure in this variety of tennis-elbow.

**Patient's Posture.**—The patient sits with his elbow held at 45 degrees short of full extension and the forearm in the mid-position between supination and pronation.

**Technique.**—The physiotherapist sits facing the patient and places the tip of her middle finger, reinforced by the index, on the antero-lateral aspect of the humerus, just above the epicondyle. She imparts the friction by drawing her finger horizontally to and fro; her whole forearm takes part in the movement.

**Duration of Treatment.**—Twenty minutes two or three times a week. Manipulation and exercises do not follow.

**Result.**—Full relief may be confidently expected in two to four weeks.



PLATE 36

## PLATE 37

## TENNIS-ELBOW: MILLS'S MANIPULATION

**Indication.**—The teno-periosteal variety of tennis-elbow.

**Contra-Indications.**—Lesions of the extensor group of muscles other than at the origin of the common tendon from the periosteum at the lateral humeral epicondyle.

**Patient's Posture.**—The patient sits upright with his arm abducted to the horizontal and so far medially rotated that the olecranon faces upwards.

**Technique.**—The physiotherapist stands behind him and brings his forearm into full pronation and fully flexes his wrist. When treating the right elbow, she holds the patient's upper limb in this position by grasping the dorsum of his hand with her right hand. When a patient with a tennis-elbow has his arm held in this position, he automatically eases the strain on the extensor group of muscles by flexing the elbow. The physiotherapist, while keeping her attention focused on her right hand so as not for an instant to relax the pressure which maintains full flexion at his wrist, forces full extension at his elbow with a smart jerk downwards of her left hand.

This manipulation is very painful at the instant of its performance. It should be preceded by deep friction to the affected point (see Plate 33) both to induce massage analgesia and to thin out fibrous tissue.

**Duration of Treatment.**—The manipulation should be carried out once only at each visit. Massage followed by manipulation should be performed twice weekly until the patient is well. Two to six weeks' treatment is usually required.

**Results.**—Not more than three-quarters of all cases are fully relieved by this method. If the patient is not beginning to improve after two weeks, or nearly well at the end of four, it is not worth while continuing treatment. He should be referred back to his doctor, who may elect to repeat Mills's manipulation under nitrous oxide anæsthesia or to institute cock-up splintage.

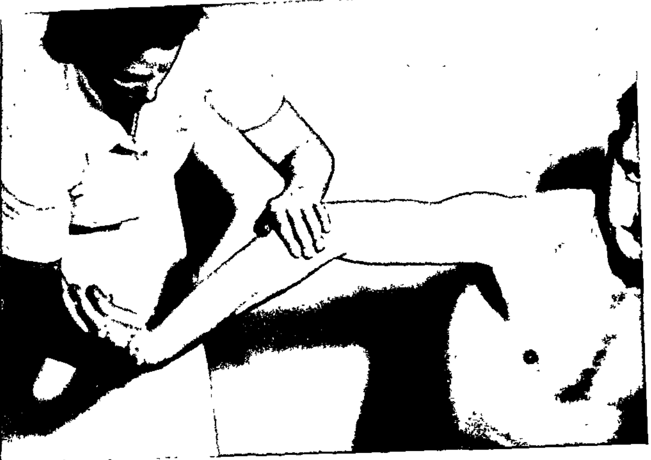


PLATE 37

## PLATE 37

### TENNIS-ELBOW: MILLS'S MANIPULATION

**Indication.**—The teno-periosteal variety of tennis-elbow.

**Contra-Indications.**—Lesions of the extensor group of muscles other than at the origin of the common tendon from the periosteum at the lateral humeral epicondyle.

**Patient's Posture.**—The patient sits upright with his arm abducted to the horizontal and so far medially rotated that the olecranon faces upwards.

**Technique.**—The physiotherapist stands behind him and brings his forearm into full pronation and fully flexes his wrist. When treating the right elbow, she holds the patient's upper limb in this position by grasping the dorsum of his hand with her right hand. When a patient with a tennis-elbow has his arm held in this position, he automatically eases the strain on the extensor group of muscles by flexing the elbow. The physiotherapist, while keeping her attention focused on her right hand so as not for an instant to relax the pressure which maintains full flexion at his wrist, forces full extension at his elbow with a smart jerk downwards of her left hand.

This manipulation is very painful at the instant of its performance. It should be preceded by deep friction to the affected point (see Plate 33) both to induce massage analgesia and to thin out fibrous tissue.

**Duration of Treatment.**—The manipulation should be carried out once only at each visit. Massage followed by manipulation should be performed twice weekly until the patient is well. Two to six weeks' treatment is usually required.

**Results.**—Not more than three-quarters of all cases are fully relieved by this method. If the patient is not beginning to improve after two weeks, or nearly well at the end of four, it is not worth while continuing treatment. He should be referred back to his doctor, who may elect to repeat Mills's manipulation under nitrous oxide anæsthesia or to institute cock-up splintage.



PLATE 38

## PLATE 38

## TENNIS-ELBOW : AUTHOR'S MANIPULATION

**Indication.**—Tennis-elbow of the teno-periosteal variety.

**Contra-Indications.**—Tennis-elbow in which the lesion lies at the musculo-tendinous junction, in the belly of the extensor muscles, or at the humeral origin of the extensor carpi radialis longus muscle.

**Patient's Posture.**—The patient should adopt the half-lying position on the couch, so that his trunk lies steady. His shoulder must not shift during the manipulation.

**Technique.**—When the right elbow is to be treated, the physiotherapist stands by his right side with her right foot on the couch level with his upper thigh. Her knee is so placed that her right elbow gains support from its inner aspect. She places her right hand at the inner side of his elbow, her fingers lying posteriorly so as to keep the joint fully extended. Her left hand grasps the outer side of his wrist while her thumb on the radius maintains full supination of the forearm.

With a sharp jerk of her right hand away from, and her left hand towards, herself, aided by an adduction movement of her right thigh, she strongly forces adduction (varus) at the elbow, taking care to maintain the joint in full extension and supination throughout. This manipulation stretches out the lateral aspect of the elbow ; this is where the lesion lies. A crack is heard whether a tennis-elbow is present or not.

**Duration of Treatment.**—This manœuvre should be carried out once only, immediately after massage to the anterior aspect of the lateral epicondyle (Plate 33). This secures massage analgesia and breaks up scar-tissue at this point in preparation for the manipulation. The manipulation should be repeated two or three times a week until the patient is well. General anæsthesia is not required since the manipulation is not unduly painful.

**Results.**—Only about half of all cases are curable in this way by physiotherapists. Thus, if the patient is not markedly better at the end of a month, he should be referred back to his doctor.



PLATE 39

## PLATE 39

## GOLFER'S ELBOW

MASSAGE TO COMMON FLEXOR TENDON JUST BELOW MEDIAL HUMERAL EPICONDYLE

**Site of Lesion.**—Strain occurs at the musculo-tendinous junction more often than at the teno-periosteal junction. It follows a series of repeated, often occupational, strains rather than a single injury. The affected fibres lie immediately below the medial epicondyle. The treatment is massage alone.

**Frequency.**—Quite common. The condition is often very chronic, many patients giving a history as long as ten years.

**Indication.**—Acute or chronic strain of the flexor muscles at this point.

**Patient's Posture.**—The patient adopts the half-lying position on the couch, his arm stretched out horizontally and supported. His arm is laterally rotated so as to bring the medial epicondyle to face forwards.

**Technique.**—The physiotherapist stands behind his elbow and holds his forearm supinated and his elbow extended with one hand; this maintains the medial epicondyle in an accessible position. With the middle finger of her other hand, reinforced by the index, she identifies the medial epicondyle and then shifts her hand a quarter of an inch distally; this brings the ulnar border of her long finger to lie against the lower border of the epicondyle. Her thumb applies counter-pressure at the outer aspect of the elbow. By keeping her finger pressing, and by flexing and extending her waist, her whole hand is made to rotate to and fro round the forearm. As a result, the physiotherapist's finger is drawn backwards and forwards over the muscle.

Massage here is both tiring to give and painful to receive. Tenderness is universal at this point in normal persons and is naturally more severe in those in whom a lesion is present.

**Duration of Treatment.**—Thirty minutes' massage every three or four days should be aimed at in chronic cases. Half this period suffices in recent cases. Neither manipulation nor exercises should follow the massage.

**Results.**—In recent cases a fortnight's treatment is usually enough. In chronic cases, *i.e.* lasting up to five years, a month may be required. One-quarter of all cases lasting over five years prove intractable.

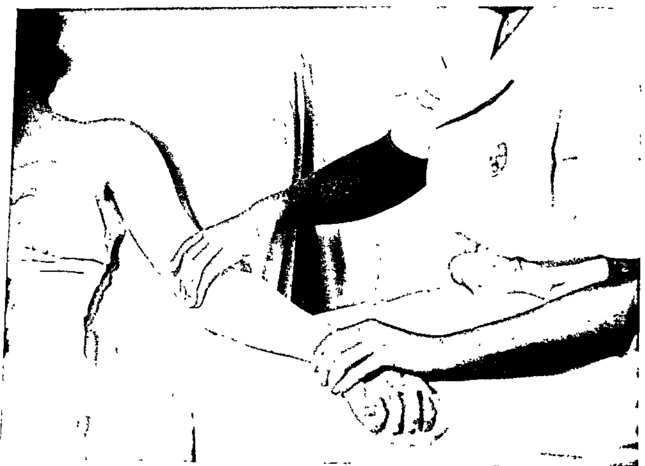


PLATE 40

## PLATE 40

### GOLFER'S ELBOW

MASSAGE TO COMMON FLEXOR TENDON AT MEDIAL HUMERAL CONDYLE

**Site of Lesion.**—The less common site for a strain at the elbow of the flexor muscles controlling the wrist lies at the teno-periosteal junction (see Plate 39). The tender area is directly on the medial epicondyle of the humerus at the origin of the common flexor tendon.

**Frequency.**—Fairly common in middle-aged men who play tennis well (forehand drive), golf (right elbow only), or go in for fencing.

**Indication.**—Acute or chronic strain of the flexor muscles at this point. *The more recent the causative strain, the sooner* will adequate massage bring about recovery.

**Patient's Posture.**—The patient adopts the half-lying position on the couch. His elbow is kept just short of full extension. His forearm is supinated, being supported on the physiotherapist's knees, and is held in this position by her hand at his wrist.

**Technique.**—The physiotherapist places the tip of her index finger on the anterior aspect of the medial epicondyle of the humerus, reinforcing it with the tip of the long finger. Her thumb supplies counter-pressure at the outer aspect of the upper forearm. By an alternate extension and flexion movement at her wrist and a simultaneous alternating intensification and slackening of her grip on the forearm, she draws the tip of her index finger diagonally upwards and outwards from the tip to the base of the epicondyle.

**Duration of Treatment.**—Fifteen or twenty minutes twice a week. All except the longest-standing cases recover in less than a month's treatment. Manipulation and exercises should not follow.

**Results.**—Cases that have lasted less than a year often get well with one or two sessions. If the disorder has lasted some years, several weeks' treatment may be required. Not quite all the cases are curable when the disorder has been present for more than five years.

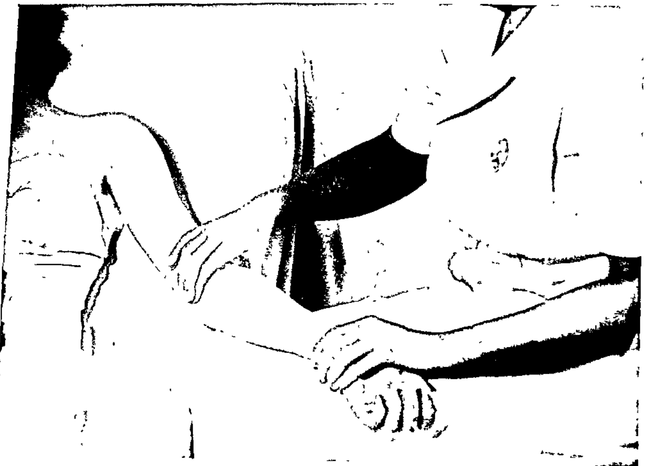


PLATE 40

## PLATE 41

## ELBOW-JOINT: REDUCTION OF DISPLACED LOOSE BODY

**Nature of Lesion.**—A loose body in the elbow-joint may form as the result of an injury which chips off a piece of cartilage—in such a case the radiograph does not reveal its existence. In osteochondritis dessicans the fragment consists partly of bone and is visible on the X-ray plate. In marked osteoarthritis several bony loose bodies may form; they may or may not give rise to attacks of internal derangement.

**Frequency.**—Uncommon.

**Indication for Manipulation.**—Displacement of a loose body.

**Anæsthesia.**—This is not often called for. In my experience those loose bodies that prove incapable of reduction by manipulation without anæsthesia can seldom be restored to their position with general anæsthesia.

**Patient's Posture.**—The patient adopts the half-lying position; keeping her trunk at the far side of the couch she abducts her affected arm to the horizontal and bends her elbow to a right angle. An assistant, standing at her head, supplies counter-traction by grasping her arm just above the elbow with both hands.

**Technique.**—Traction must be maintained while rotation is forced and the elbow-joint gradually extended meanwhile. The manipulator therefore grasps the patient's wrist with both hands and pulls hard. He rotates the forearm quickly to and fro, and, at the same time, by bending his trunk away from the couch, extends the patient's elbow as far as it will go (this is *not* far in these cases). He and the patient feel a click, and movement becomes more free. However, since the elbow remains the site of traumatic arthritis consequent upon the original subluxation of the loose body, the joint does not regain its full range of movement immediately even after successful reduction. Experience alon



when reduction has been obtained and how long to go on trying at any one session.

**After-treatment.**—If the displacement has persisted for some weeks before reduction is achieved, rest in flexion may be required for the traumatic arthritis. If it is only a question of some days, the joint may recover completely within a week without further treatment.

## PLATE 42

## EXTENSORES CARPI RADIALIS TENDONS

**Site of Lesion.**—Teno-vaginitis in these structures is a common result of overuse, and is therefore often found in factory workers who repeat the same task all day, *e.g.* at a lathe. The lesion lies at the distal half-inch of the tendon and at the teno-periosteal junction at the dorsal aspect of the base of the second and third metacarpal bones.

**Frequency.**—Common. Very common in industrial districts.

**Indication for Massage.**—Non-specific teno-vaginitis, acute or chronic. The presence of crepitus or swelling is no bar to massage.

**Patient's Posture.**—The patient sits and puts his forearm across the physiotherapist's knees.

**Technique.**—The physiotherapist sits beside the patient, half facing him. With one hand she holds his wrist flexed, so as to stretch the tendons. With the middle finger-tip of the other hand she identifies the affected stretch of tendon. Usually both radial extensor tendons are affected. She reinforces with the index finger. Friction is imparted to the tendons by means of a horizontal to-and-fro movement of her whole forearm and hand.

**Duration of Treatment.**—Twenty minutes three times a week. Neither exercises nor passive movements should follow. For the duration of treatment, if the cause is occupational, the patient should cease working and merely avoid such exertion as causes pain. Splintage is quite unnecessary.

**Results.**—So far every case in my experience has recovered in one to two weeks, including long-standing cases which may already have been treated without avail by prolonged immobilization or electrical methods.



PLATE 42

## PLATE 43

## EXTENSOR DIGITORUM COMMUNIS TENDON

**Site of Lesion.**—This is a teno-vaginitis due either to occupational overuse or an isolated sprain of the wrist. The tendon and its sheath are affected where they cross the lunate bone.

**Frequency.**—Uncommon.

**Indication for Massage.**—Non-specific teno-vaginitis.

**Patient's Posture.**—The patient sits and places his forearm across the physiotherapist's knees.

**Technique.**—The physiotherapist sits at the patient's side, facing him. She flexes his wrist by the pressure of her hand on his, thereby stretching the tendon. She places the tip of her middle finger, reinforced by the index, on the tendon and imparts the friction by a horizontal to-and-fro movement of her forearm.

**Duration of Treatment.**—Twenty minutes three times a week. Neither active nor passive movements should follow. For the duration of treatment the patient should stop working (if the cause is occupational) and do nothing that brings on the pain. Splintage is not required.

**Results.**—Full relief has always been attained within a fortnight.

### LOCALIZED CAPSULAR ADHESIONS OVER THE LUNATE BONE

The cause is a flexion sprain of the wrist.

The physiotherapist's technique is identical except that she should identify the extensor tendon of the fingers and push it aside with her finger before giving the friction to the capsule of the joint underneath.

Full relief is obtained in two weeks as a rule.

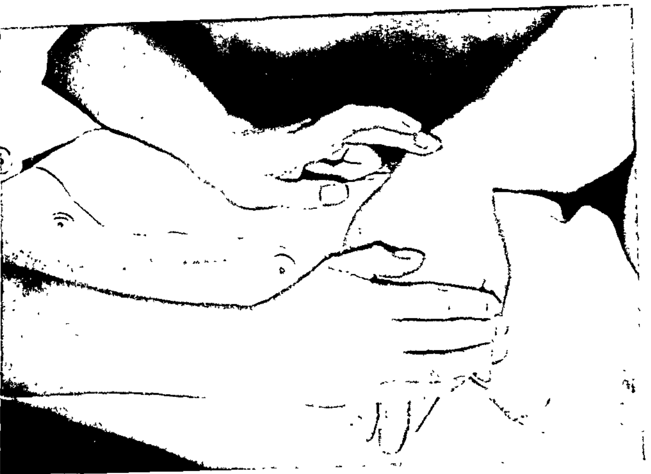


PLATE 43

## PLATE 43

## EXTENSOR DIGITORUM COMMUNIS TENDON

**Site of Lesion.**—This is a teno-vaginitis due either to occupational overuse or an isolated sprain of the wrist. The tendon and its sheath are affected where they cross the lunate bone.

**Frequency.**—Uncommon.

**Indication for Massage.**—Non-specific teno-vaginitis.

**Patient's Posture.**—The patient sits and places his forearm across the physiotherapist's knees.

**Technique.**—The physiotherapist sits at the patient's side, facing him. She flexes his wrist by the pressure of her hand on his, thereby stretching the tendon. She places the tip of her middle finger, reinforced by the index, on the tendon and imparts the friction by a horizontal to-and-fro movement of her forearm.

**Duration of Treatment.**—Twenty minutes three times a week. Neither active nor passive movements should follow. For the duration of treatment the patient should stop working (if the cause is occupational) and do nothing that brings on the pain. Splintage is not required.

**Results.**—Full relief has always been attained within a fortnight.

### LOCALIZED CAPSULAR ADHESIONS OVER THE LUNATE BONE

The cause is a flexion sprain of the wrist.

The physiotherapist's technique is identical except that she should identify the extensor tendon of the fingers and push it aside with her finger before giving the friction to the capsule of the joint underneath.

Full relief is obtained in two weeks as a rule.



PLATE 44

## PLATE 44

### EXTENSOR CARPI ULNARIS TENDON

**Site of Lesion.**—Teno-vaginitis of this tendon may be set up both by overuse and by a single sprain of the wrist. The lesion usually occurs at the part of tendon between the metacarpal and cuneiform bones, but may occur between the latter and the head of the ulna.

**Frequency.**—Fairly common.

**Indication for Massage.**—Non-specific teno-vaginitis, acute or chronic.

**Patient's Posture.**—The patient sits with his forearm placed pronated across the physiotherapist's knees.

**Technique.**—The physiotherapist sits by his side, facing him. With one hand she grasps his hand from the palmar aspect and holds it in slight flexion and full radial deviation at the wrist. This stretches the tendon and separates the base of the fifth metacarpal bone from the cuneiform bone and the head of the ulna, thus enabling the physiotherapist's finger to obtain adequate access. She grasps the patient's wrist with her other hand in such a way that her thumb lies on the affected stretch of tendon, and her fingers on the other side of the wrist. The friction is imparted by a to-and-fro movement of her thumb across the tendon; this is attained by alternate flexion and extension movements at her wrist. The fingers are used as a fulcrum and to supply counter-pressure.

**Duration of Treatment.**—Twenty minutes three times a week. No exercises follow. If the teno-vaginitis is occupational, the patient should stop work until well, and do nothing that brings on the pain. Splintage does not hasten recovery.

**Results.**—Full relief has always been obtained in two weeks.



PLATE 45

## PLATE 45

## ABDUCTOR LONGUS AND BOTH EXTENSOR POLLICIS MUSCLES: TENDONS IN LOWER FOREARM

**Site of Lesion.**—Teno-vaginitis here is nearly always the result of occupational overuse and often occurs in those who repeatedly grasp objects, *e.g.* at a lathe. It is also common in coal-miners. A single sprain may occasionally damage the tendons. All three tendons are affected together. In recent cases crepitus is common, but has been met with even after several months' immobilization in a plaster cast.

**Frequency.**—Common.

**Indication for Massage.**—Non-specific teno-vaginitis, acute or chronic. Neither crepitus, swelling nor an effusion contra-indicates massage.

**Patient's Posture.**—The patient sits and places his knuckles on the physiotherapist's knee. He keeps his forearm almost horizontal, thereby ensuring flexion at his wrist and stretching of the tendons.

**Technique.**—The physiotherapist sits at the patient's side, *facing him. With one hand she holds his wrist flexed,* her thumb and fingers grasping his metacarpus. She places her fingers at the front of his wrist and her thumb along the affected tendons where they cross the dorsal aspect of the lower end of the radius. She imparts the friction by alternately adducting and abducting her thumb while maintaining pressure. The tendons are clearly palpable as her thumb rides over them.

**Duration of Treatment.**—Twenty minutes three times a week. Neither active nor passive movements should follow. If the cause is occupational, the patient should cease work until well and in the meanwhile do nothing that brings on the pain. Splintage affords no added advantage.

**Results.**—Full relief has always been achieved in a fortnight or less in my experience.

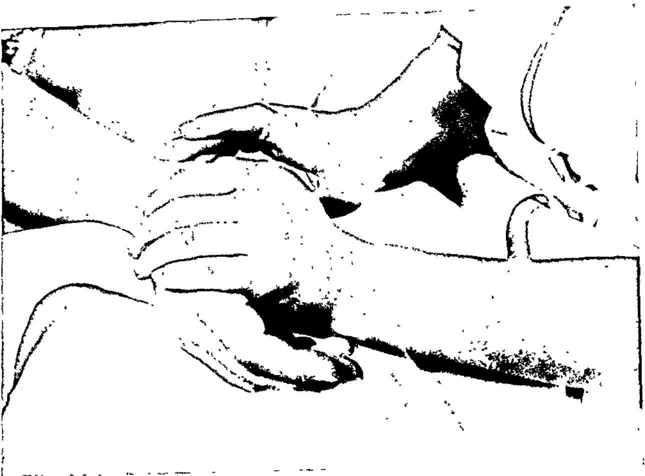


PLATE 46

## PLATE 46

## ABDUCTOR LONGUS AND EXTENSOR BREVIS POLLICIS MUSCLES: TENDONS AT CARPUS

**Site of Lesion.**—Teno-vaginitis here is nearly always the result of occupational overuse. A few cases follow an isolated sprain; yet others come on gradually for no apparent cause. It is a most chronic lesion and one meets patients who have been in constant severe pain for one or two years, *even* while the forearm and thumb are immobilized in a plaster cast. The condition is also known as "styloiditis radii" and "teno-vaginitis stenosans." The carpal extent of these tendons is always affected, but they may also be involved where they groove the base of the radius.

**Frequency.**—Quite common.

**Indication for Massage.**—Non-specific teno-vaginitis.

**Contra-indication.**—Rheumatoid teno-vaginitis of these tendons.

***Patient's Posture.***—*The patient sits and places his forearm* across the physiotherapist's knees. This is held in the mid-position between pronation and supination, so that the radius lies uppermost.

**Technique.**—The physiotherapist sits facing the patient and at his side. She presses the palm of one hand against his thumb and her fingers against the side of his hand so as to flex his thumb and press his hand towards ulnar deviation. This should be done gradually and gently, since the movement is very painful if performed abruptly on a patient with a severe lesion. She then places her middle *finger, reinforced by the index, on the affected stretch of* tendon. The friction is imparted by a horizontal to-and-fro movement of her whole forearm. Massage here is very painful, but is nevertheless ineffective unless given deeply.

**Duration of Treatment.**—Half an hour's friction twice weekly is required. No movements follow. The patient must use his hand as little as possible; indeed, he is seldom able to do much.

**Results.**—The achievement of full relief takes three months. This is a long time, but all other non-operative treatments known to me are useless. At the end of a month the patient may be no better, but this must not lead to abandonment of the massage, which in my experience is always effective in the end. Only when patients are seen within a few days of the onset can results be attained in a week or two, as in the case of the other tendons at the wrist.

**Caution.**—The styloid process of the radius is very tender in this condition and the patient may point to it as the source of his pain. Nevertheless, massage should not be given here; it is painful and useless.

**Note.**—The operation of slitting up the tendon-sheath is always immediately curative. This should be mentioned to the patient so that he can make his choice between massage and operation.

### EXTENSOR LONGUS POLLICIS TENDON

When teno-vaginitis occurs at the carpal extent of this tendon, the friction is imparted in an analogous way. This tendon, like the others at the wrist, recovers in a fortnight.



PLATE 47

## PLATE 47

## DIGITAL FLEXOR TENDONS IN LOWER FOREARM

**Site of Lesion.**—This is nearly always a teno-vaginitis due to overuse. It occurs well above the level of the carpus. Physiotherapists are liable to this lesion.

**Frequency.**—Quite uncommon.

**Indication for Massage.**—Non-specific teno-vaginitis, acute or chronic.

**Contra-indication.**—Rheumatoid teno-vaginitis here.

**Patient's Posture.**—The patient sits with his forearm supinated and supported on the physiotherapist's lap.

**Technique.**—The physiotherapist sits facing the patient. With one hand she holds his fingers and wrist extended so as to stretch the digital flexor tendons. She places two fingers of the other hand on the affected length of tendon. Friction is imparted by her drawing her whole forearm to and fro so that the fingers ride over the tendon from side to side.

**Duration of Treatment.**—This should last twenty minutes on alternate days. Exercises do not follow and the patient should avoid such movements as cause pain until well. Splintage is unnecessary.

**Results.**—Lasting relief has regularly been achieved in a fortnight.



PLATE 48

## PLATE 48

## FLEXOR CARPI ULNARIS TENDON

**Site of Lesion.**—In the few cases seen with a lesion at this site the cause was a single overstrain. The teno-periosteal junction between the tendon and the base of the fifth metacarpal bone was affected alone.

**Frequency.**—Rare.

**Indication for Massage.**—Non-specific tendinitis.

**Patient's Posture.**—The patient sits with his forearm held horizontally and the wrist extended.

**Technique.**—*Only an exceptionally strong physiotherapist* can give effective friction here. She sits by the patient's side, facing him. Her one hand grasps his palm, thus holding his hand in extension. The patient's little finger stays loosely flexed so as to relax the hypothenar muscles. The physiotherapist presses her thumb with all her might on the affected point, applying her fingers at the dorsum of his wrist for counter-pressure. By alternately pronating and supinating her forearm, the thumb is drawn to and fro over the teno-periosteal junction. This friction hurts the physiotherapist far more than the patient.

**Duration of Treatment.**—As long as the physiotherapist can manage. Ten minutes, followed by ten minutes' rest, then another ten *minutes once a week is enough. It will take the* physiotherapist's thumb several days to recover.

**Results.**—Uniformly good. One patient who had been under continuous treatment for two years by every physiotherapeutic measure, local anæsthesia, months of immobilization in a plaster cast and several manipulations under anæsthesia, all without any effect, was lastingly relieved by five sessions of such friction.



PLATE 49

## PLATE 49

## WRIST-JOINT: REDUCTION OF SUBLUXATION

**Nature of Lesion.**—The only joint at which persistent subluxation appears to occur is that between the capitate and lunate bones. This is where the tenderness lies and where the click on reduction is felt. As the subluxation is not visible radiographically, it is not possible to state whether it is the lunate bone or the capitate that has become displaced.

**Frequency.**—Fairly common.

**Patient's Posture.**—The patient sits, her pronated forearm pointing towards the manipulator. Only if difficulty in reduction is experienced—this seldom happens—need the patient adopt the half-lying position on the couch and have her arm held by an assistant (as in Plate 41).

**Technique.**—The manipulator grasps the patient's forearm and hand, one of his thumbs lying just above, the other just below, her wrist. He pulls with the hand grasping the patient's hand and uses his other hand for counter-traction. During this traction the two hands are moved vertically up and down in opposite directions. (The photograph shows the extreme of downward movement of the manipulator's distally-placed hand.) This moves the distal row of carpal bones on the proximal during traction. Reduction is signalled by a click.

**Duration of Treatment.**—Ten minutes at the most.

**Result.**—Reduction is easy and immediate relief follows even in cases that have persisted for months. Symptoms due to secondary ligamentous strain occasionally remain after reduction but disappear at once following one or two sessions of deep massage given as for localized adhesions at the lunate bone (see Plate 43). There is a tendency to recurrence but, once the patient knows what is the nature of the disorder at his wrist, he has only to have the subluxation reduced again without delay.



PLATE 49

## PLATE 50

### TRAPEZIO-FIRST-METACARPAL JOINT

**Site of Lesion.**—Osteo-arthritis, which comes on gradually for no apparent reason in patients at, or past, middle-age. The anterior aspect of the joint-capsule is usually that chiefly affected. The arthritis is often bilateral and may be associated with osteo-arthritis of the interphalangeal joints. Involvement of the trapezio-first-metacarpal joint also occurs in rheumatoid arthritis and gout. It may also arise after a sprain or a fracture involving the joint surface (*e.g.* Bennett).

**Frequency.**—Fairly common.

***Indication for Massage.***—*Traumatic arthritis or osteo*-arthritis.

**Contra-Indications.**—Rheumatoid arthritis or gout.

**Patient's Posture.**—The patient sits and puts his hand, palm facing upwards, on the physiotherapist's knee.

**Technique.**—The physiotherapist sits by the patient's side, facing him. She holds his thumb with one hand, hyper-adducting it in extension so as to bring the front of the joint into prominence. The thumb of her other hand is well flexed at the terminal joint and placed on the joint-line. Her fingers apply counter-pressure dorsally. She imparts the friction by alternately pronating and supinating her forearm. This moves the thumb to and fro over the joint-capsule.

The physiotherapist now flexes the patient's thumb and brings his forearm more into pronation. Using the same technique as before, she now applies friction to the outer aspect of the joint. (Not illustrated )

**Duration of Treatment.**—Fifteen minutes three times a week. The friction is followed by gentle forcing of movement at the joint and by exercises.

**Results.**—Inconstant. Considerable relief is obtainable in most cases of osteo-arthritis. Eventual relapse is probable. But no other treatment known to me brings even this degree of improvement. In traumatic arthritis without fracture, full relief is regularly obtainable in a fortnight.



PLATE 50

## PLATE 51

## DORSAL INTEROSSEOUS MUSCLE OF HAND

**Site of Lesion.**—This is nearly always traumatic, either as the direct result of a blow or secondary to a metacarpal fracture. Strain from overuse occurs in players of stringed instruments.

**Frequency.**—Uncommon.

**Patient's Posture.**—The patient sits and puts his hand on *the physiotherapist's knee.*

**Technique.**—The physiotherapist sits at his side, steadying his elbow with her hand. She lays the tip of the middle finger of her other hand between the shafts of the metacarpal bones on the affected area of muscle. The index finger may reinforce the dorsum of the long finger. She imparts the friction by rotating her forearm.

**Duration of Treatment.**—Fifteen minutes is enough. One to two weeks' treatment on alternate days may be required.

**Results.**—In my experience, success follows invariably and quickly, no matter how long the symptoms have lasted. A musician can confidently be told that he will be able to play again more or less without symptoms on the day after the first session of massage, even if he has been wholly incapacitated for months

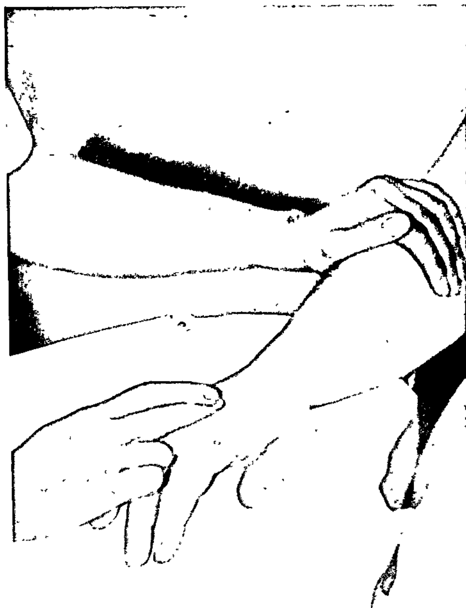


PLATE 51

## PLATE 52

## INTERPHALANGEAL JOINT OF HAND

**Nature of Lesion.**—Gouty, rheumatoid, traumatic and osteo-arthritis occur here.

**Frequency.**—Common except for gout.

**Indications for Massage.**—Traumatic arthritis during the first week after the injury. Osteo-arthritis at any time.

**Contra-Indications.**—Rheumatoid or gouty arthritis.

**Patient's Posture.**—The patient sits and puts his hand on the physiotherapist's knee.

**Technique.**—The physiotherapist sits by the patient's side, facing him. She grasps the sides of the affected joint between her index finger and thumb and, maintaining good pressure, moves her hand up and down vertically as far as the elasticity of the skin over the joint allows. She then rotates the patient's forearm through a right-angle and, with the same technique (not illustrated), massages the anterior and posterior aspects of the joint.

**Duration of Treatment.**—Ten minutes for each technique is required. In recent traumatic cases, three times weekly is best; for osteo-arthritis, twice weekly suffices. In the latter case forcing movement follows the massage.

**Results.**—In recent trauma, immediate improvement is often secured, *i.e.* the patient may be almost or quite well in about a fortnight and able to do without treatment. If no benefit follows a few sessions, the massage is not worth continuing. In these cases, and in long-standing traumatic arthritis, the spontaneous cure that always takes place within a year or so (as long as no destruction of cartilage has occurred) should be awaited. No treatment known to me materially increases the speed of spontaneous recovery in chronic cases following injury. If cartilage has been destroyed, the disability is permanent.



PLATE 52

## PLATE 53

## INTERCOSTAL MUSCLE

**Nature of Lesion.**—Scarring in this muscle occurs as the result of direct injury, often secondary to fracture of a rib, occasionally for no apparent reason.

**Frequency.**—Common.

**Indication for Massage.**—At any time after the onset of pain. In cases of injury, massage is indicated after the lapse of three days ; before this local anæsthesia should be preferred.

**Patient's Posture.**—The patient adopts the half-lying position on the couch.

**Technique.**—The physiotherapist sits by his side and puts the tip of the middle finger of one hand in the sulcus between two ribs. She may reinforce this finger with the index. The nether finger should be moved to and fro over the affected area in line with the ribs. The movement is imparted by alternately flexing and extending the elbow and shoulder joints.

**Duration of Treatment.**—Ten to fifteen minutes on alternate days. Two or three adjacent intercostal muscles are often affected together ; each spot should receive not less than ten minutes' friction. Treatment is seldom required for more than a fortnight. One or two sessions often suffice.

**Results.**—No matter how long-standing the condition, or whether it is of traumatic or apparently spontaneous onset, quick success is invariable.



PLATE 53

## PLATE 54

## OBLIQUE ABDOMINAL MUSCLES: COSTAL ORIGIN

**Site of Lesion.**—This may be traumatic, the result of a strain (*e.g.* during heavy lifting); or it may come on insidiously for no apparent reason. With rare exceptions, the fibres of origin at the costal margin are those affected.

**Frequency.**—Strain in this region is a good deal commoner than is supposed. The patient often believes himself to be suffering from visceral pain and differential diagnosis is at times difficult.

**Patient's Posture.**—The patient adopts the half-lying position on the couch and fully relaxes his abdominal wall. This relaxation must be maintained throughout the period of massage.

**Technique.** — The physiotherapist sits facing him and sufficiently indents the abdomen with her middle finger to enable its tip to reach the posterior surface of the costal edge. To this end she flexes the terminal joint only of this finger, reinforcing with the index if necessary. In this way alone can the fibres of origin of the muscle be caught against the bone. Maintaining an upward and forward pressure against the edge of the rib, she moves her finger-tip to and fro along it by a motion of the whole forearm.

**Duration of Treatment.**—Twenty minutes twice weekly for two to four weeks, even in very long-standing cases.

**Results.**—Uniformly good.

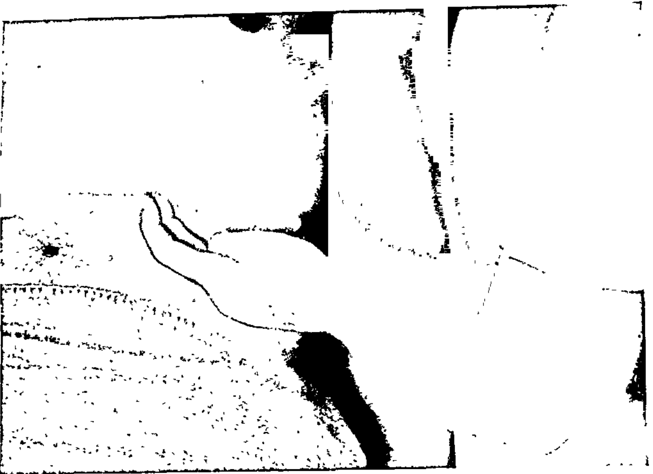


PLATE 54

## PLATE 55

## EXTERNAL OBLIQUE MUSCLE: ILIAC FIBRES

**Nature of Lesion.**—In my experience strain here has come on for no ascertainable reason.

**Frequency.**—Rare.

**Patient's Posture.**—The patient lies flat on the couch so as to stretch out the abdominal wall. If necessary, a cushion may be placed at his lumbar region; for the muscles must be kept taut enough to ensure that none of the massage reaches the viscera.

**Technique.** — The physiotherapist sits level with the patient's hips, facing towards him on the same side as the lesion. She places two or three finger-tips on the affected fibres. The transverse friction is imparted by a horizontal to-and-fro movement of her forearm and hand.

**Duration of Treatment.**—Half an hour twice a week.

**Results.**—Uniformly good. Full lasting relief may be expected in two to four weeks.

### INTERNAL OBLIQUE MUSCLE

When the massage has to be given to the *internal oblique muscle,* the position and technique are exactly the same except that she then gives the friction to the iliac fossa on the patient's *far* side



PLATE 55

## PLATE 55

## EXTERNAL OBLIQUE MUSCLE: ILIAC FIBRES

**Nature of Lesion.**—In my experience strain here has come *on for no ascertainable reason.*

**Frequency.**—Rare.

**Patient's Posture.**—The patient lies flat on the couch so as to stretch out the abdominal wall. If necessary, a cushion may be placed at his lumbar region; for the muscles must be kept taut enough to ensure that none of the massage reaches the viscera.

**Technique.** — The physiotherapist sits level with the patient's hips, facing towards him on the same side as the lesion. She places two or three finger-tips on the affected fibres. The transverse friction is imparted by a horizontal to-and-fro movement of her forearm and hand.

**Duration of Treatment.**—Half an hour twice a week.

**Results.**—Uniformly good. Full lasting relief may be expected in two to four weeks.

### INTERNAL OBLIQUE MUSCLE

When the massage has to be given to the *internal oblique muscle*, the position and technique are exactly the same except that she then gives the friction to the iliac fossa on the patient's *far* side.



PLATE 56

## PLATE 56

## GENERAL POSITION FOR GIVING MANUAL VIBRATIONS TO ABDOMEN

**Indication.**—Dyspepsia or constipation caused by intestinal spasm. Manual vibrations cause relaxation of intestine in spasm; hence they achieve re-education in such conditions as functional dyspepsia, spastic colitis and uncomplicated constipation.

**Patient's Posture.**—The patient adopts the half-lying position on a low couch in a warm room. His head is comfortably supported on a small pillow. His arms lie by his sides; for by putting his hands behind his neck he stretches the abdominal wall. The hinge on the couch should lie level with his upper lumbar region. His thighs lie in contact with the couch; otherwise his knees get in the way of the physiotherapist's elbow. He fully relaxes his abdominal wall.

**Technique.**—The physiotherapist sits on a chair the same height as the couch and closely enough to him to bring her shoulder almost vertically above her elbow. Her arm hangs loosely from the shoulder joint; her elbow is held nearly at a right angle. Her forearm, wrist and hand form an almost straight line. Her finger-tips, which must be warm, rest on that part of the abdominal wall overlying the length of intestine to be treated. The pressure with which the vibrations are given is adjusted by the tone of her triceps and wrist flexor muscles.

There are many ways in which the physiotherapist may impart vibrations to the intestine. Rapid and small alternating flexion and extension movements of the fingers, wrist and elbow may be used in varying combinations. The deeper the vibration needs to reach, the coarser it should be and the more the proximal joints of the limb have to be employed.

No pain must be set up; for this makes the patient tauten his muscles, whereupon they, and not the intestine, receive treatment. The physiotherapist must wait till he relaxes again and then go on.



The position shown is suited to the right side of the transverse colon. Were the duodenum to be affected, the position would be the same, but the pressure of the physiotherapist's hand would have to be great enough to indent the abdominal wall considerably.

**Duration of Treatment.**—At first one hour for six days a week is essential. *Daily treatment should be kept up until the* patient is much better. For the long-standing cases (in which manual treatment is so often required) this may well mean one, two or three months. Thereupon the patient is kept at this improved level by treatment on five, then four, then three, then two occasions in a week. Variations in the symptoms should lead to the appropriate alteration in the number of sessions held in the week. When the patient remains symptom-free, or at least comparatively so, with a session once a week, he may cease treatment. The whole period necessary to secure good lasting relief varies between two and six months. Patients with years of ill-health behind them should be encouraged to do as much more as the improvement in their symptoms warrants. Eventual minor relapses are not uncommon since the constitutional factor in these cases is large. The patient should be asked to appear at once if symptoms recur; a very few treatments can then overcome them.

**Results.**—A competent physiotherapist and a persevering patient are required. Under good conditions, at least 75 per cent. of patients with many years' severe abdominal symptoms are fully or at least adequately relieved.



PLATE 57

## PLATE 57

## MANUAL VIBRATIONS: FOR AFFECTING PYLORUS

**Indication.**—Pyloric spasm.

**Patient's Posture.**—As described in text facing Plate 56.

**Technique.**—The physiotherapist lays her hand on the epigastrium and gets the patient fully to relax his abdominal wall. In some cases the pylorus may be palpable, but if much tenderness is present, it is better not to attempt deep palpation at once. After several sessions much often becomes readily palpable that could not be felt on the first occasion. Any action that sets up pain makes it harder to secure that relaxation of the musculature which alone allows the vibrations to reach deeply.

When tenderness is considerable, the fine vibrations imparted by the fingers working alone are suitable. Later on, when greater pressure comes to be tolerated, the rather coarser vibrations imparted by wrist and elbow movements are applied because of their greater power of penetration.

The middle finger-tip does most of the work in this position. Depending on the shape of the physiotherapist's hand, the site of the pylorus, and the configuration of the patient's ribs and xiphisternum, either the index or the ring finger is also used—seldom both—to help the middle finger. Thus two of the four fingers lie idly on the patient's abdominal wall.

When towards the close of the session the pylorus has begun to relax, the manipulation illustrated in Plate 61 should follow.



PLATE 58

## PLATE 58

## MANUAL VIBRATIONS : FOR AFFECTING DUODENUM

**Indication.**—Duodenal spasm.

**Patient's Posture.**—As described in text facing Plate 56.

**Technique.**—The physiotherapist lays her finger-tips just below the patient's right costal margin and presses as hard as she can without causing discomfort. The patient has to get used to this pressure, and relax his muscles in spite of it. This may take a few moments.

There is usually less tenderness in duodenal than in pyloric spasm; hence the coarser type of vibration in which the wrist and elbow are also used can often be employed at once.

The index and middle fingers are the operative ones in the case of the duodenum. Occasionally the tip of the ring finger can be brought to bear a little as well. The little finger lies inert.

When, at the end of the session, the duodenum has begun to relax, the manipulation illustrated in Plate 61 is employed.

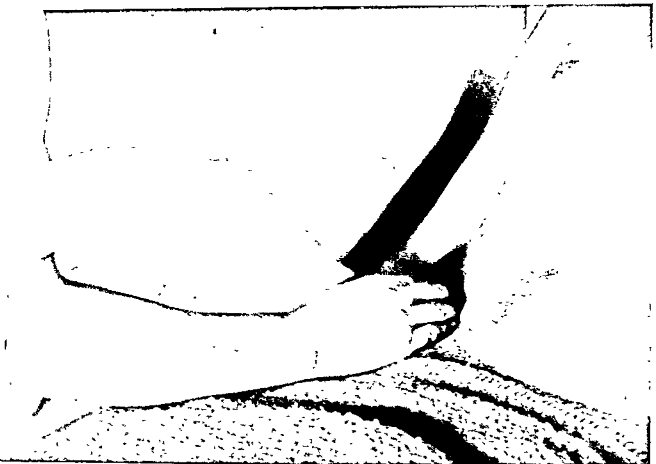


PLATE 59

## PLATE 59

### MANUAL VIBRATIONS: FOR AFFECTING ASCENDING COLON

**Indication.**—Spasm of the ascending colon.

**Patient's Posture.**—As described in text facing Plate 56.

**Technique.**—The physiotherapist lays her hand on the abdominal wall at the patient's right iliac fossa and identifies the spastic length of intestine. This as a rule is clearly palpable. Muscular relaxation is usually easy to secure.

The ulnar border of the little finger and the tips of the ring and middle fingers form a line parallel to the ascending colon, and these three fingers should be used *en bloc* to impart the vibration. To this end the physiotherapist holds her hand well short of full pronation, and the wrist movement is chiefly alternate radial and ulnar deviation. The index finger lies inert.

#### TRANSVERSE COLON

When the transverse colon lies low, the same technique as that described above is required. The position of the physiotherapist's hand is merely appropriately changed. When, however, it lies high, the technique illustrated in Plate 57, with a small downward shift of the hand to reach the correct spot, is suitable.



PLATE 60

## PLATE 60

## MANUAL VIBRATIONS: FOR AFFECTING DESCENDING COLON

**Indication.**—Spasm of the descending colon.

**Patient's Posture.**—As described in text facing Plate 56.

**Technique.** — The physiotherapist lays her hand on the abdominal wall at the patient's left iliac fossa. The affected length of intestine is usually identified easily; and in most cases there is no difficulty in securing relaxation of the abdominal musculature. The physiotherapist should press her hand well into the iliac fossa.

The operative digits are the little, ring and middle fingers. The thumb and index finger lie idle. Since the vibrations have to reach deeply, it is again at the wrist that the chief movement takes place. This is mostly alternate ulnar and radial deviation.



PLATE 61

## PLATE 61

## GASTRIC COMPRESSION

**Indication for Manipulation.**—Distension of the stomach. After the pylorus or duodenum has begun to relax under the influence of continued vibrations, the stomach should be encouraged to contract.

**Patient's Posture.**—As described in text facing Plate 56.

**Technique.**—The physiotherapist stands at the patient's right shoulder, facing towards his abdomen. She places her left hand on the lateral aspect of his left lower ribs. The ulnar border of her right hand indents his lower abdomen. By strong pressure, gradually increased for a couple of seconds and then slowly released, the stomach is compressed. Her left hand presses medialwards; her right hand lifts the abdominal contents upwards and towards the left.

### THE CÆCUM

A similar manipulation carried out on a smaller scale in the right iliac fossa may be employed in cases of cæcal dilatation after relaxation of the ascending colon has begun (see Plate 59).

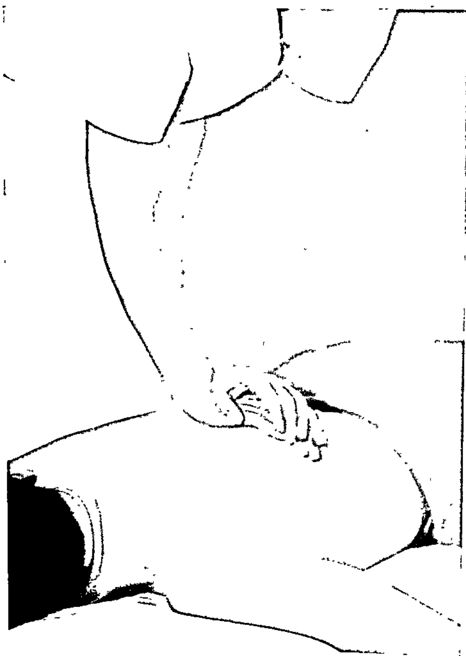


PLATE 62

## PLATE 62

# FORCED EXTENSION OF THORACIC SPINE

### FOR PATIENTS WITH KYPHOSIS

**Indication.**—Thoracic kyphosis. Limitation of extension at the thoracic intervertebral joints—whether of postural origin, or caused by early spondylitis deformans (not in the acute stage) or capsular adhesions—requires treatment by forced extension at these joints. In children with a postural kypho-lordosis, the movement should be forced before they are taught the exercises that will maintain the improved position.

**Patient's Posture.**—The patient lies prone on the couch and relaxes his trunk muscles.

**Technique.**—The physiotherapist stands facing the patient, level with his thorax. She places the heel of her hand centrally on his mid-thoracic spine, and reinforces with the heel of her other hand pressing on her wrist. Her fingers merely lie on the patient's chest wall, remaining inert. She asks the patient to take a deep breath in, then out. At the end of his expiration she suddenly brings the whole of her body weight down on to her hands on the patient's spine, thus forcing extension. In spondylitis deformans the pressure is more gradually applied.

*In normal people, even in children, cracks are heard* and felt as adhesions part.



PLATE 63

## PLATE 63

## FORCED EXTENSION OF THORACIC SPINE

### FOR PATIENTS WITHOUT KYPHOSIS

**Indication.**—When extension requires forcing in the absence of a thoracic kyphosis, the previous method is inapplicable because insufficient extension movement is obtained. Moreover, this method enables extension to be forced more selectively. Hence it is the method of choice when general anæsthesia is employed.

**Patient's Posture.**—The patient lies prone on the couch, his arms crossed in front of him and held at chin level. He relaxes his trunk muscles.

**Technique.**—The physiotherapist stands at the patient's side, facing him and level with his waist. She passes one forearm under the upper part of his chest and lifts his trunk until the position of full extension is reached. She places the heel of her other hand at the appropriate point on his thoracic spine. By a sharp twist of her whole trunk she pulls upwards with the forearm under his chest and at the same time jerks her other hand downwards. The result is that an acute extension movement is forced.

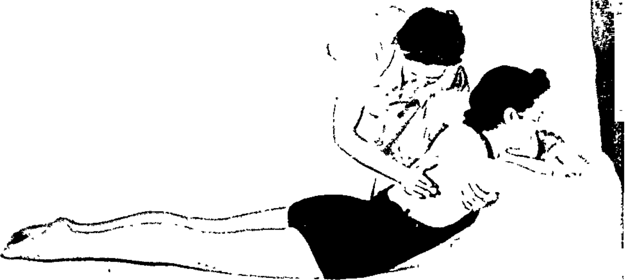


PLATE 63

## PLATE 64

## FORCED ROTATION OF LOWER THORACIC SPINE (SITTING)

**Indications.**—Pain on, or limitation of, rotation at the lower thoracic spinal joints due to diffuse capsular adhesions. Locking of the lateral articular facets prevents rotation at the lumbar intervertebral joints; hence forced rotation of the trunk affects mainly the lower thoracic spinal joints. Nevertheless, this manipulation is useful in attempting reduction of a displaced fragment of the cartilaginous disc at a low lumbar intervertebral joint.

**Patient's Posture.**—*The patient sits astride the end of the* couch. He crosses his arms in front of him so as to steady the shoulders.

**Technique.**—The physiotherapist stands close behind him. Assuming that his trunk is to be rotated leftwards, she passes her left forearm in front of his chest and grasps his right shoulder. Care must be taken that this forearm does not press on the patient's neck, but lies at the level of the clavicles. The physiotherapist then grips his left shoulder with her right hand, the fingers lying anteriorly. This position brings her forearm to bear on his right scapular area. She then walks round to her right, turning the patient's trunk to the left as she does so. Then, by a quick twist of her body, she pulls with her *left arm and pushes with her right forearm, thus forcing full* rotation of the patient's trunk.



PLATE 64

## PLATE 65

## FORCED ROTATION OF LOWER THORACIC SPINE (SUPINE)

**Indications.**—(1) Pain on, or limitation of, rotation at the lower thoracic spinal joints, resulting from capsular contracture or diffuse capsular adhesions. (2) Though rotation does not take place at the lumbar spinal joints, being prevented by engagement of the lateral articular processes, the fact remains that putting a rotation strain on the lower lumbar joints is one of the most effective ways of attempting reduction of a subluxated fragment of the intra-articular annulus.

**Contra-indication.**—Arthritis at the hip-joint, which would be painfully strained by the manipulation.

**Patient's Posture.**—The patient assumes the half-lying position on the couch, lying well over towards the side at which the manipulator stands, so that his knee supports her hip. This prevents the patient from slipping off the couch when the movement is forced. She must not lie in the centre of the couch ; for in this position the extreme of rotation cannot be obtained, the patient's knee engaging against the edge of the couch before the full range of movement is reached.

**Technique.**—The manipulator stands level with the patient's waist, facing towards her far hip. He flexes the thigh on the side farther from him and adducts it across her body. He supinates his forearm, and applies his palm to the outer side of her knee. By pressing this knee strongly towards the floor, the manipulator forces rotation of the pelvis with the mechanical advantage of the extra leverage afforded by the whole length of her femur. His other hand, pressing firmly at the patient's far shoulder, keeps her thorax flat on the couch. If the patient is unusually large or her spinal joints particularly stiff, the manipulator can force the knee with both hands while an assistant standing at the other side of the couch steadies her thorax.

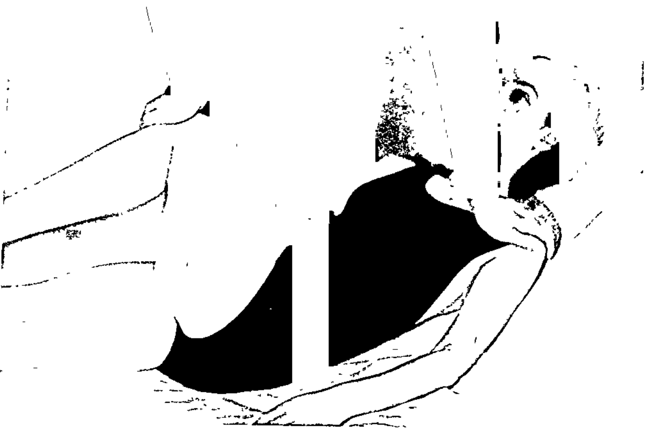


PLATE 65

In the case of capsular contracture this manipulation is carried out many times slowly by alternately increasing and diminishing the pressure on the knee. On the other hand, if the adhesions are to be ruptured or the reduction of an intra-articular subluxation is being attempted, the manipulation is carried out once only with a quick forcible jerk.

## PLATE 66

## THORACIC SPINE: ROTATION DURING TRACTION I

### THIRD MANIPULATION FOR ATTEMPTING REDUCTION OF INTRA-ARTICULAR DISPLACEMENT

**Frequency.**—Common. In my experience, internal derangement occurs chiefly at the lower six joints of the thoracic spine, and provides the common cause for what used to be called "fibrositis," "pleurodynia" or "intercostal neuritis."

**Caution.**—It is possible for a central protrusion of disc-substance at any thoracic level to squeeze the spinal cord. Indeed, some cases of thoracic cord lesion, at one time ascribed to an apparently causeless transverse myelitis, have this ætiology. Were such a displacement to occur, or to increase in size, during manipulation, irreparable damage might result. Hence it is essential that these manipulations should be carried out during strong traction.

**First Manipulation.**—During strong traction, extension at the thoracic spine is forced as shown in Plate 62. The manipulator's hands are, of course, placed at the requisite thoracic level.

**Second Manipulation.**—During strong traction, extension with *some rotation is forced as shown in Plate 73 for the* lumbar spine, the manipulator's hands again being placed at the requisite thoracic level.

**Indication for Third Manipulation.**—(1) If the first two manipulations have had good effect but have ceased, on being repeated, to bring about further improvement, the purely rotational manipulations should follow. (2) If the first two manipulations have had no effect on the patient's symptoms, an attempt should be made at rotation during traction. (3) If gentle forcing of even a small degree of extension at the affected thoracic spinal joint causes considerable pain, it is clear that the patient will not be able to tolerate the first



PLATE 66

PLATE 66a

two manipulations at all. In such a case, rotation during traction may be cautiously attempted.

**Anæsthesia.**—General anæsthesia is strongly contra-indicated, for if the patient is unconscious the manipulator has no way of knowing whether he is making the condition better or worse.

**Patient's Posture.**—The patient lies on her side on a low couch, and stretches her arms above her head. When the traction is applied she must relax her spinal muscles as much as possible, so that the joints bear the stress.

**Assistants.**—Two are essential. They sit on the floor facing the patient and each other, their feet steadied against the legs of the couch. One assistant grasps the patient's ankle, leaving the other leg free. If the symptoms are unilateral, she should pull on the leg of the painful side. The second assistant and the patient grasp each other's wrists. The traction is applied with due regard to the movement about to be forced by the manipulator, so that he is aided by the way in which his assistants direct their pull. They can maintain their strongest pull for only ten to fifteen seconds; thus the manipulator, standing with his hands already in position on the patient's trunk, has only a short interval before he forces rotation. In the uncommon event of a displacement lying at an *upper* thoracic joint, the assistant should grasp the patient's head, not his wrists; otherwise the traction carried by his scapular muscles is in part exerted too low down (see Plate 66*a*).

**Technique.**—The manipulator places his one hand on the patient's buttock, the other against the prominent border of her scapula. Since her arm is in full elevation and strongly held, this bone serves admirably as a shelf against which to press. He then pauses for some moments until traction has exerted its full effect, and uses his body weight to press the patient's thorax towards and her pelvis away from himself with a strong jerk. This is not a pure movement of the arms; it is rather a forcing of his arms in opposite directions by the momentum imparted by the downward thrust of his trunk.

**Assessment of Progress.**—As soon as rotation has been forced, the patient stands up and the thoracic joint move-

ments are tested anew. The patient reports any alteration in site or severity of symptoms; the manipulator observes any change either in range of movement or in which movements aggravate the pain. If the symptoms have lessened, the manipulation is repeated as often as it does good; then, or if there has been no improvement, the manipulator passes on to the next method of forcing rotation (see Plate 67).

## PLATE 67

## THORACIC SPINE: ROTATION DURING TRACTION II

### FOURTH MANIPULATION FOR ATTEMPTING REDUCTION OF INTRA-ARTICULAR DISPLACEMENT

See general remarks at p. 212

**Indication for Fourth Manipulation.**—If the third manipulation has not helped, or has ceased to help, this different method of forcing rotation may be tried.

**Patient's Posture.**—The patient lies on her side on the couch. She and the assistant grasp each other's wrists; the other assistant holds on to the ankle on the same side as the patient's pain. The assistants' traction now widens the joint, especially on the side where the displacement lies.

**Technique.**—The manipulator stands facing the patient's lumbar region. If the pain is left-sided, he hooks the fingers of one hand about the anterior superior spine of her left ilium, and presses with the heel of his other hand against the mid-thoracic extent of the left erector spinæ muscle.

During strong traction, he pulls the hand on the ilium towards himself, and presses hard with his hand on the thorax. Rotation is thus forced at the lower thoracic joints.

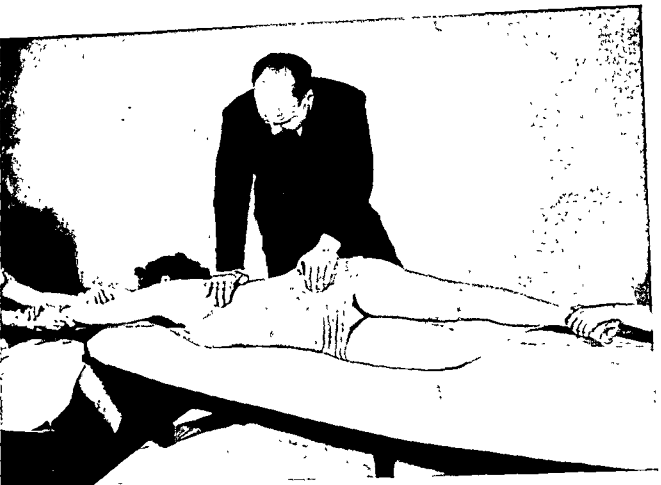


PLATE 67

## PLATE 68

## THORACIC SPINE: ROTATION DURING TRACTION III

### FIFTH MANIPULATION FOR ATTEMPTING REDUCTION OF INTRA-ARTICULAR DISPLACEMENT

See general remarks at p. 212

**Indication for Fifth Manipulation.**—If the fourth manipulation on the one hand has done no good, but on the other has not aggravated the symptoms, this stronger method of rotation, which involves using the leverage supplied by the patient's thigh, is called for.

**Patient's Posture.**—The patient lies prone on the couch. Her ankle is held by one assistant while she and the other assistant grasp each other's wrists. Strong traction is applied.

**Technique.**—The manipulator stands facing the patient's waist. He flexes the patient's hip until her thigh is at right angles to her body and curves his hand about her knee, holding it off the couch. His other hand, placed palm downwards at the side of the lower thorax farther from himself, holds the patient's upper trunk flat on the couch. When the patient relaxes and the assistants are pulling well, he draws her knee towards himself without letting her thorax move. The pelvis is thus strongly rotated by means of the leverage afforded by the length of the patient's femur. Much greater purchase is obtained in this way, so that care must be taken not to use too much force.

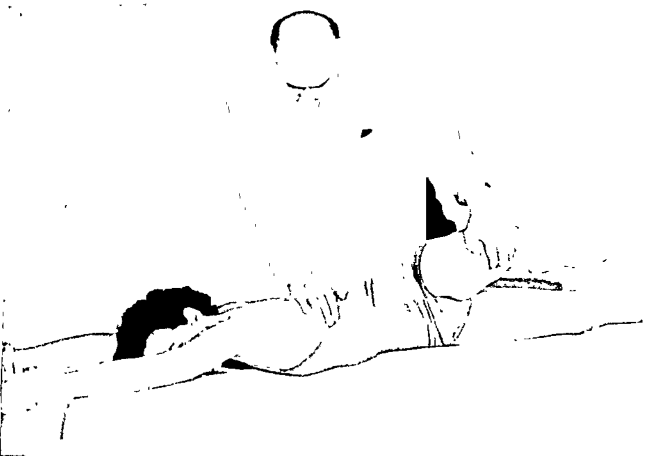


PLATE 68

## PLATE 69

## THORACIC SPINE: ROTATION DURING TRACTION IV

### SIXTH MANIPULATION FOR ATTEMPTING REDUCTION OF INTRA-ARTICULAR DISPLACEMENT

See general remarks at p. 212

**Indication for Sixth Manipulation.**—If the previous manipulations have ceased to have any effect, but have done no harm, this manipulation—the strongest possible way of forcing rotation—may be attempted.

**Patient's Posture.**—The patient lies face upwards on the couch. She and one assistant grasp each other's wrists; the other assistant holds her ankle. Strong traction is then applied.

**Technique.**—The manipulator stands at the patient's waist facing towards her hips. He flexes the hip on the side away from himself to a right angle and applies his palm to the outer aspect of her knee. His fingers overlie her patella; his forearm is almost fully supinated. The heel of his other hand engages against the outer border of the patient's scapula, which is fixed in relation to her thorax by the traction which holds her arm fully elevated. When he feels the patient relax and the assistants to be pulling well, he rotates her pelvis by pressing her knee smartly towards the floor while keeping her thorax still on the couch with his other hand.

Great leverage is obtained by using the patient's femur as a lever; care should be exercised not to push too hard.

**Results.**—The performance of manipulation *during traction* has resulted in a large increase in the proportion of successes. Two-thirds of all patients, even those with a subluxation of some years' standing, are relieved. The trouble is, however, to maintain reduction. Since there is never any lordosis at the thoracic part of the vertebral column, the inclination of the joint surfaces inevitably encourages redisplacement. Hence patients commonly have to return at intervals for repetition of manipulative reduction.

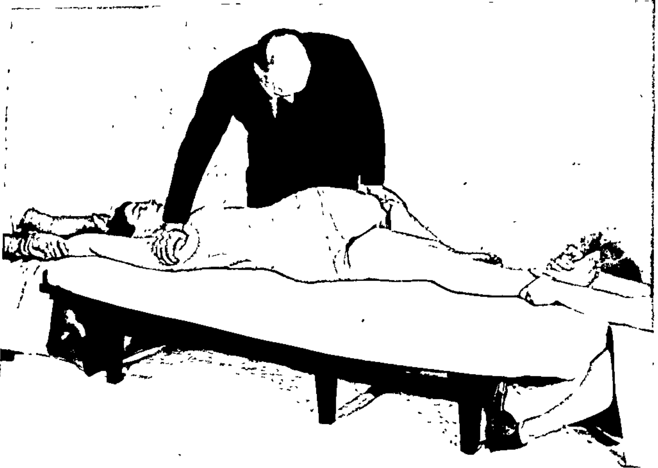


PLATE 69

## PLATE 70

## SUPRASPINOUS LIGAMENT IN LUMBAR REGION

**Site of Lesion.**—These ligaments appear to remain a cause of pain after manipulative reduction of a fragment of intervertebral disc.

**Frequency.**—Uncommon. Lesions here seldom recover spontaneously.

**Patient's Posture.**—The patient lies prone, with his head supported and relaxes his sacrospinalis muscles.

**Technique.**—Since great strength is required in this situation, both hands are employed. The physiotherapist lays her middle finger flat on the affected ligament, using the middle finger of the other hand, reinforced by the index, to supply added pressure. The friction is given by drawing the hands backwards and forwards horizontally. Special attention must be paid to the necessity for securing a great enough sweep in spite of the vigorous pressure required.

**Duration of Treatment.**—This should be given not more often than twice weekly. If the patient is very sore afterwards, once every five, six or seven days may be preferable.

**Results.**—Full lasting relief is usually obtained.



PLATE 70

## PLATE 71

## COCCYX

**Site of Lesion.**—There are four types of coccygodynia, depending on where the injury occurs. Nearly every case is traumatic. The lesion may lie at (*a*) the posterior sacro-coccygeal ligament; (*b*) the intercoccygeal ligaments; (*c*) the origin of the gluteus maximus muscle from the sides of the sacrum; and (*d*) at the tip of the coccyx. The exact site of tenderness must be determined before the massage is begun. Very few cases are functional.

**Frequency.**—Common.

**Indication for Massage.**—Any of the above varieties of coccygodynia.

**Contra-indication.**—Pain referred to the coccyx.

**Patient's Posture.**—The patient lies prone on the couch and relaxes the gluteal muscles.

**Technique.**—The physiotherapist sits at the patient's side, facing towards his feet. She places her index finger, re-inforced by the middle finger, on the affected spot. If the lesion is at the sacro-coccygeal or inter-coccygeal ligaments she imparts the friction by alternate small pronation-supination movements of her forearm such as move the index finger horizontally across these ligaments. If the gluteal fibres of origin are involved, she presses deeply inwards and forwards at the side of the coccyx and draws her finger up and down the edge of the bone by a horizontal movement of her forearm. When the tissues at the tip of the coccyx are affected, the friction may have to be given vertically or hori-zontally, depending on which particular strand of fibrous tissue there is involved. She must try to see for herself.

**Duration of Treatment.**—Twenty minutes two or three times a week is enough. Most cases need treatment for a fort-night; a few require it for a month.



PLATE 71

**Results.**—No matter how long-standing, nineteen patients out of twenty are well in one month; the majority have recovered in a fortnight.

NOTE

Coccygodynia is one of several conditions, at present regarded as very difficult to treat, in which the physiotherapist can most quickly prove the value of proper friction.

## PLATE 72

## LUMBAR SPINE: FORCED EXTENSION (CENTRAL)

### FIRST MANIPULATION FOR ATTEMPTING REDUCTION OF SUBLUXATED FRAGMENT OF INTERVERTEBRAL DISC

**Indication.**—Displacement of a fragment of the annulus fibrosus in a low lumbar spinal joint, whether causing backache, lumbago or sciatica.

**Contra-indications.**—Marked lumbar kyphosis of recent onset; marked lateral deviation of the lower lumbar spine of recent onset; considerable bilateral limitation of straight-leg raising; neurological signs indicating severe pressure on a lumbar nerve-root; referred coccygeal pain; pulpy protrusions.

**Patient's Posture.**—The patient lies face downwards on a low couch. A couch of the height ordinarily found in physiotherapy departments cannot be used, for the manipulator's body-weight must be poised right over the patient's trunk. The maximum height for the couch is eighteen inches, and it must be firm. It is not possible to perform any of these manipulations on a sprung couch or on the bed in a patient's house; a mattress on the floor is quite suitable, however. If examination of the patient has shown that she possesses a considerable range of trunk-extension, it is often advantageous to raise the end of the couch so that she lies with the trunk already held slightly in extension (as shown in the illustration). She relaxes her muscles as much as possible.

**Technique.**—The manipulator stands level with the patient's waist, facing towards her. He places one hand across her lumbar region without pronating the forearm fully, so that the mid-shaft of his fifth metacarpal bone engages against the prominence formed by the spinous process of each lumbar vertebra in turn (see inset). He reinforces with his other hand. It is usually best to start at the uppermost lumbar spinous process and work downwards, one by one, unti[illegible]fth is



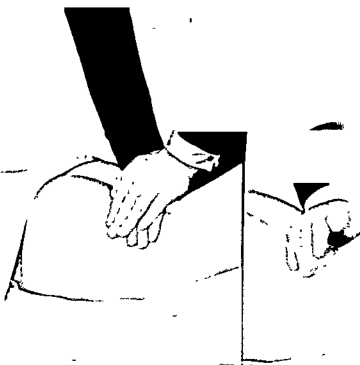


PLATE 72

reached. The whole width of the palm of the nether hand must not be used; for the manipulator's strength is then dissipated by the attempt to force movement at several joints at once; it is by tilting this hand a little so that the ulnar border is applied to only one spinous process at a time that an effective movement can be imparted to each joint in turn.

The upper limb corresponding to the nether hand is kept rigid, so that it acts as a stiff rod communicating the thrust of the manipulator's trunk as he presses towards the floor with a number of quick jerks. There is a little play in his other elbow. Extension is forced at all the lumbar spinal joints, each being subjected to jerks of increasing magnitude until the manipulator's full strength is employed.

Unless these movements cause great pain, they are continued for some minutes. If they set up pain felt in the lower limb, the manipulations must be abandoned at once. Some lumbar discomfort is inevitable; but pain felt down the lower limb is clear evidence of forcing the loose fragment in the wrong direction.

**Assessment of Progress.**—The patient is now asked to stand and judge for herself if there is any change in the degree of pain; the manipulator watches to observe any alteration in the range of movement. If the patient or the manipulator —usually both—feels a thud at the lumbar spine as extension is forced, no more is done until the effect has been assessed when the patient stands and tries her trunk movements. If the patient has considerably less pain and the range of movement has markedly increased, it is probably unnecessary and it may be unwise to go on. If she has improved only slightly, the manipulations continue; if she is worse, the question arises whether the case is in fact suitable for manipulative treatment. Since decision on this point is often difficult to arrive at, and the manipulation by no means free from danger if persisted in in spite of warning signals, the manipulator—whether physiotherapist, bone-setter or osteopath—would be most unwise to proceed further without reporting the facts to the doctor in charge of the case. It is only by starting gently, paying attention to the patient's statements as she is being manipulated, and testing her movements at regular intervals, that

mistakes—perhaps irretrievable—and damage to the patient can be avoided.

**Anæsthesia.**—For this reason, too, the patient should not be given a general anæsthetic; she cannot then help the manipulator. Moreover, in my experience, recurrent intra-articular subluxations that have been previously reduced under general anæsthesia by other surgeons prove quite easy to reduce without anæsthesia; conversely, those that cannot be reduced while the patient is conscious nearly always defy attempts at reduction under anæsthesia.

**Traction.**—In contradistinction to cervical and thoracic disc-lesions, traction by assistants does not facilitate the reduction of a lumbar protrusion.

**After-treatment.**—The patient rests for a minute after the manipulations have been discontinued. If she is no better, after-treatment is naturally not called for, since this begins only after some degree of reduction has been achieved. If, on the other hand, one or other of the manipulations has done good, the following routine is useful in (*a*) assisting further forward movement of the loose fragment, and (*b*) encouraging stability in that position by increasing the power and tone of the muscles about the joint.

1. The manipulation depicted in Plate 75 is carried out quite gently a number of times.
2. This is followed by active prone-lying trunk-extension exercises.
3. Prophylaxis against further attacks is dealt with in *Rheumatism and Soft-Tissue Injuries*, page 200.

**Results.**—The best that any manipulator can hope for is to cure, for the time being, one half of all his patients. Naturally, if the protrusion is central and of small size, reduction is much easier than if it has moved postero-laterally and is large. In other words, patients with backache or lumbago (in whom the pain is due to central impingement on the dura mater) are more likely to be relievable by manipulation than those with sciatica (in whom the displacement is postero-lateral, is greater in degree, and the line which the fragment must follow in returning to its bed is curved). Thus, not more than three-quarters of all patients with backache are relievable by manipulation, and not more than a quarter when sciatica is present.

## PLATE 73

## LUMBAR SPINE: FORCED EXTENSION (LATERAL I)

### SECOND MANIPULATION FOR ATTEMPTED REDUCTION OF SUBLUXATED FRAGMENT OF INTERVERTEBRAL DISC

See general remarks on p. 228

**Indication for Second Manipulation.**—If the attempt at reduction by the method shown on Plate 72 has neither fully relieved the patient nor made him worse, this manipulation follows at once.

**Technique.**—If the pain is central, no indication is afforded whether to start on the left side or the right. If the patient's pain is unilateral, or more severe on one side than the other, the less painful side is manipulated first. The manipulator stands level with the patient's waist, facing it. He puts his hand, reinforced by the other, on her back in such a way that his pisiform bone just clears the vertebral spinous process, and keeps his forearm just short of full pronation and the wrist extended, so that this projecting bone lies at the medial fibres of the sacrospinalis muscle. By applying his pressure with this small carpal prominence, the manipulator affects only one joint at a time. Using his body-weight he gives a series of increasingly strong downward jerks, keeping his upper limbs rigid. He should start at an upper lumbar level and work downwards towards the joints at which subluxations commonly take place. He must lean well over the patient, thus exerting a strong rotational stress at the same time as extension is forced. This is a great aid towards securing reduction, and I have found this rotation-with-extension manipulation the most successful in practice.

The manipulator's hand is on the patient's back and reduction can often be felt to occur as a palpable thud, nearly always felt by the patient, and sometimes even audible to an onlooker. By contrast with the cervical spinal joints which click repeatedly when traction or forcing is carried out, whether any lesion is present or not, the lumbar joints do not



PLATE 73

give rise to these thuds during this manipulation, or during that depicted in Plate 72, unless the intra-articular cartilage is fragmented.

The patient rises and the lumbar movements are tested, objectively and subjectively, after each series of pressures. If a thud followed by improvement is noted no more is done until the following day.

## PLATE 74

## LUMBAR SPINE: FORCED EXTENSION (LATERAL II)

### THIRD MANIPULATION FOR ATTEMPTED REDUCTION OF A SUBLUXATED FRAGMENT OF INTERVERTEBRAL DISC

See general remarks at p. 228

**Indication for Third Manipulation.**—If the patient is very strongly built, the manipulator may feel that an unusual degree of pressure is required. In such a case, great force can be exerted by employing this method.

**Patient's Posture.**—The patient lies face downwards on a low couch.

**Technique.**—The manipulator stands facing the patient's waist on the same side as her pain. He grasps the front of her knee with one hand and extends her hip to the utmost, until her pelvis just rises off the couch. He places the palm of his other hand, after fully supinating his forearm, on the sacrospinalis muscle covering the fourth and fifth lumbar levels on the painful side. He places his knee on his hand. While maintaining extension at the hip with his one hand, he forces his other hand downwards by pressing on it with his knee. The patient's lower lumbar joints are thus forcibly extended during unilateral pressure towards rotation. She then rises for assessment of progress (see p. 230).

**Further Methods.**—The fourth manipulation is that depicted in Plate 65. Should this fail, the methods shown in Plates 75 and 76 may be tried. If they too fail, the subluxation is clearly irreducible by manipulation.



PLATE 74

## PLATE 75

### LUMBAR SPINE: FORCED EXTENSION

**Indication.**—After a displaced fragment of intervertebral disc has been reduced by the methods shown in Plates 65, 72, 73 and 74, this manipulation may be gently performed a number of times to assist the loose piece of cartilage to settle in its anterior position.

**Patient's Posture.**—The patient lies face downwards on a low couch. He relaxes his trunk muscles fully. The physiotherapist must stand on a stool if the couch is high.

**Technique.**—The physiotherapist passes her forearm under the patient's knees and lifts them up until his abdomen leaves the couch. Her elbow is held almost at a right angle and her hand is hooked round the patient's thigh just above the knee. The nearer to her elbow his thighs lie, the more purchase she has. She then places her other hand at the patient's lower lumbar region. With a quick side-flexion movement of her trunk she lifts his knees a little more and presses hard downwards on his lower back with her other hand. Extension is thus forced. Cracks are heard and felt in normal people as well as in patients.



PLATE 75

## PLATE 76

### LUMBAR SPINE: FORCED SIDE-FLEXION

**Indications.**—Occasionally this manipulation is called for in attempting reduction of a subluxated fragment of cartilage at a lower lumbar joint.

**Patient's Posture.**—The patient lies on his side on a low couch and relaxes his trunk muscles. He steadies himself thus by his forearms. He must keep his hips fully extended throughout; if not, the physiotherapist cannot force this lumbar movement. If the couch is high she must stand on a stool.

**Technique.**—The physiotherapist stands behind the patient level with his hips. She asks him to extend his hips and passes her forearm about his nether thigh, hooking her hand round it just above his knee. She lifts both thighs until his side leaves the couch. She lays her other hand on his upper loin, just above the iliac crest. By means of a quick side-flexion movement of her trunk she now raises his thighs a little more and presses down hard with her other hand, thus forcing side-flexion of the lumbar spine.



PLATE 76

## PLATE 77

## SACRO-ILIAC JOINT: REPOSITION BY MARSHALL'S METHOD

**Nature of Lesion.**—Fixed subluxation at the sacro-iliac joint may not be reducible by the ordinary rotation mobilization of the trunk (see Plates 64 and 65). In these cases the displacement appears to be a rotation of the ilium forwards on the sacrum.

**Frequency.**—Rare.

**Indication for Manipulation.**—Fixed subluxation.

**Patient's Posture.**—The patient lies on her painless side on the couch.

**Technique.**—The manipulator, having placed his knee on the couch, uses his thigh to steady her sacrum. The foot of his other leg is on the floor. She flexes her thigh and leg on the affected side. By grasping her knee with one hand and her shoulder with the other he forces the thigh backwards and the shoulder forwards simultaneously. The reduction is always felt by the patient, and usually by the manipulator too.

**Anæsthesia.**—So far I have not failed to affect reposition without anæsthesia. There is no appreciable pain and, since no muscle controls movement at the joint, muscular relaxation is immaterial.

**After-Treatment.**—Corsetry to maintain the corrected position is required at once and should be kept up for at least a year. The patient should not play games for several months.



PLATE 77

## PLATE 77

## SACRO-ILIAC JOINT: REPOSITION BY MARSHALL'S *METHOD*

**Nature of Lesion.**—Fixed subluxation at the sacro-iliac joint may not be reducible by the ordinary rotation mobilization of the trunk (see Plates 64 and 65). In these cases the displacement appears to be a rotation of the ilium forwards on the sacrum.

**Frequency.**—Rare.

**Indication for Manipulation.**—Fixed subluxation.

**Patient's Posture.**—The patient lies on her painless side on the couch.

**Technique.**—The manipulator, having placed his knee on the couch, uses his thigh to steady her sacrum. The foot of his other leg is on the floor. She flexes her thigh and leg on the affected side. By grasping her knee with one hand and her shoulder with the other he forces the thigh backwards and the shoulder forwards simultaneously. The reduction is always felt by the patient, and usually by the manipulator too.

**Anæsthesia.**—So far I have not failed to affect reposition without anæsthesia. There is no appreciable pain and, since no muscle controls movement at the joint, muscular relaxation is immaterial.

**After-Treatment.**—Corsetry to maintain the corrected position is required at once and should be kept up for at least a year. The patient should not play games for several months.



PLATE 78

## PLATE 78

### HIP-JOINT: FORCING FLEXION

**Indications.**—Osteo-arthritis of the hip-joint in the first or second stage. The chronic stage of the arthritis at the hip that complicates spondylitis deformans.

**Contra-indications.**—Osteo-arthritis in the third stage; spondylitic arthritis during a flare; infective arthritis.

**Patient's Posture.**—The patient assumes the half-lying position on the couch.

**Technique.**—The physiotherapist stands at the side of the couch facing the patient's head and level with his knees. She flexes the thigh at the hip-joint as far as it will comfortably go; his knee flexes automatically when this is done. She then forces the thigh towards further flexion by steadily increasing pressure applied at the knee. No jerk is given. This continues, with pauses, for some five or ten minutes.



PLATE 79

## PLATE 79

### HIP-JOINT: FORCING EXTENSION

**Indications.**—See text facing Plate 78. In addition, children are occasionally encountered in whom a lumbar lordosis is the result of a small amount of congenital limitation of extension at the hip-joints.

**Contra-indications.**—See text facing Plate 78.

**Patient's Posture.**—The patient lies face downwards on the couch and relaxes the flexor muscles of her hip-joint.

**Technique.**—The extension movement must be confined to the hip-joint by preventing any stress from reaching the lumbar spinal joints. The physiotherapist, standing level with the patient's thigh, must therefore keep the pelvis on the couch by strong pressure with one hand applied at the mid-buttock. With the other, grasping the front of the thigh just above the patella, she gradually pulls upwards with all her strength. This stretching is continued for five to ten minutes, with intervals for resting both the patient and herself.



PLATE 80

## PLATE 80

## HIP-JOINT: FORCING MEDIAL ROTATION

**Indications.**—See text facing Plate 78.

**Patient's Posture.**—The patient lies prone on the couch and flexes the knee on the affected side to a right-angle.

**Technique.**—The physiotherapist stands level with the patient's hips. She must not allow the pelvis to tilt during the manipulation; to this end she must hold down the buttock on the far side by strong pressure with one hand. Her other hand grasps the patient's ankle and forces his leg outwards. This leverage enables rotation of the thigh at the hip to be strongly forced without much effort; too much pressure must not be exerted for fear of fracturing the neck of the femur.

## FORCING LATERAL ROTATION

This is required only in dancers, who may find themselves handicapped in certain steps by a range of lateral rotation too *small for their purposes, though it would be ample for* ordinary persons.

The movement is forced in the reverse way. The physiotherapist stands level with the patient's hips facing his feet. She applies one hand to his buttock, while her other hand forces the leg medially. It is immaterial on which side of the couch the physiotherapist stands, though better purchase is obtained by standing on the side distant from the affected hip-joint. (Not illustrated.)

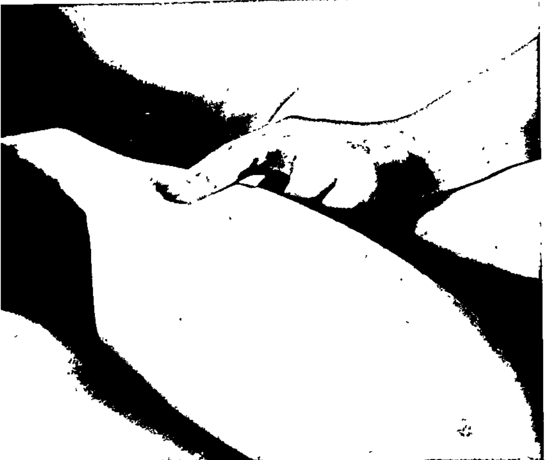


PLATE 81

## PLATE 81

## RECTUS FEMORIS MUSCLE: TENDON

**Nature of Lesion.**—This is usually a traumatic tendinitis, more often from indirect than from direct violence.

**Frequency.**—Rare.

**Indication for Massage.**—Non-specific tendinitis.

**Patient's Posture.**—The patient adopts the half-lying position on the couch.

**Technique.**—The physiotherapist sits at the patient's side, facing his thigh. She identifies the anterior superior spine of the ilium and discovers the tendon some three inches below this point and in line with it. She places her index and middle fingers on the tendon, and imparts the friction by a horizontal to-and-fro movement of her whole forearm and hand.

**Duration of Treatment.**—Twenty minutes twice a week suffices. Three to six weeks' treatment is usually needed.

**Results.**—Uniformly good.

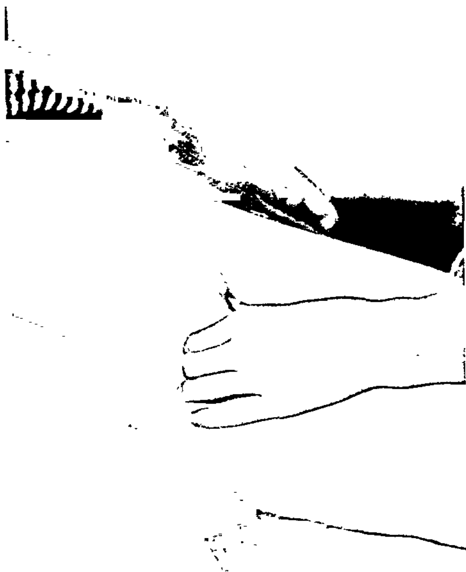


PLATE 82

## PLATE 82

## ADDUCTOR LONGUS MUSCLE OF THIGH: MUSCULO-TENDINOUS JUNCTION

**Nature of Lesion.**—This is traumatic and nearly always the result of a sudden over-contraction of the adductor muscles, such as occurs during riding. Hence the name "rider's sprain." Ballet dancers may overstretch the muscle. Of the two lesions that occur in the adductor muscles the commoner is that which occurs at the musculo-tendinous junction of the adductor longus muscle.

**Frequency.**—Uncommon nowadays.

**Patient's Posture.**—The patient adopts the half-lying position on the couch, holding the affected thigh somewhat in abduction and lateral rotation.

**Technique.** — The physiotherapist sits level with the patient's knees, facing him. Her hand grasps the affected area of muscle between her thumb and her index and middle fingers. She imparts the friction by drawing her hand medialwards.

**Duration of Treatment.**—Twenty minutes twice a week is enough and three to six weeks' treatment may be required. After the friction the limb should be stretched out passively into full abduction. The patient repeats this movement himself twice daily.

**Results.**—In all recent and most chronic cases the results are good. A few chronic cases merely improve, and relapse when riding is attempted again.



PLATE 83

## PLATE 83

## ADDUCTOR BREVIS MUSCLE OF THIGH: FEMORAL INSERTION

**Nature of Lesion.**—This is the less common site of the two traumatic lesions occurring in the adductor muscles of the thigh. See text facing Plate 82.

**Frequency.**—Rare.

**Patient's Posture.**—The patient adopts the half-lying position on the couch, and abducts, flexes and laterally rotates the thigh, flexing the knee somewhat as well.

**Technique.**—The physiotherapist sits level with the patient's knee, facing him. She identifies the sulcus between the quadriceps and the adductor muscles. By deep outwardly-directed pressure in this sulcus, she brings her middle finger, reinforced by the index, against the shaft of the femur at the level of the lesion. Though a strictly transverse friction is not now imparted by her moving her finger up and down against the bone, this is in fact the only technique by which these fibres can be massaged at all.

**Duration of Treatment.**—Twenty minutes twice a week for three to six weeks.

**Results.**—Uniformly good.



PLATE 84

## PLATE 84

## TIBIAL COLLATERAL LIGAMENT OF KNEE

### MASSAGE IN EXTENSION

**Nature of Lesion.**—In youngish patients this is nearly always traumatic; in middle age and later chronic strain at this ligament often complicates early osteo-arthritis of the knee. The lesion commonly lies at that part of the ligament overlying the joint-line and attached to the medial meniscus. Less often it lies just below this point at the level of the tibial condyle. A lesion at the femoral condyle is uncommon.

**Frequency.**—Sprain of the tibial collateral ligament is the commonest result of accidents to the knee. Chronic strain is also very common, both as the late result of an injury and complicating impaction of a small loose body (see Plate 98).

**Indication for Massage.**—All lesions of the ligament without ossification.

**Contra-Indication.**—Ossification in the ligament (Stieda-Pellegrini's disease). The radiographic finding of a small node is not a contra-indication to active treatment.

**Patient's Posture.**—The patient lies on the couch with his knee held in as full extension as possible.

**Technique.**—The physiotherapist sits by the patient's knee and places her fingers on the inner and her thumb on the outer side of the joint in such a way that the index finger covers the affected part of the ligament. The grip is strengthened by reinforcement with the middle finger. By alternately flexing and extending her wrist, she moves the forefinger to and fro over the ligament, keeping the thumb still to form the fulcrum. The ligament is thus moved over the bone at the anterior part of its range of movement. If the injury is very recent, great tenderness will be found necessitating a gradual beginning to the friction. Indeed, it may well take the physiotherapist a quarter of an hour of very gentle massage to prepare the spot for the one or two minutes' relatively deep

friction that really moves the ligament. If the massage has been adequately given, a large increase in the range of flexion is immediately obtainable without pain; *e.g.* 90° limitation of flexion may give way to only 45° limitation as soon as the treatment ceases. This is one of the most easily obtained and dramatic results of massage obtainable in the whole realm of physiotherapy. Immediately following this treatment the physiotherapist forces the fullest attainable extension at the knee (see Plate 91); quite gently if the injury is recent; with a sharp jerk if long-standing adhesions require rupture.

**Duration of Treatment and Results.**—See text facing Plate 85.

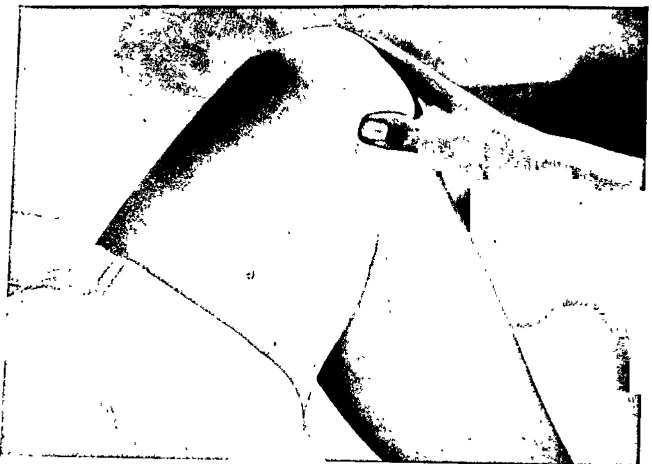


PLATE 85

## PLATE 85

## TIBIAL COLLATERAL LIGAMENT OF KNEE

### MASSAGE IN FLEXION

**Patient's Posture.**—The patient lies on the couch with his knee well bent up.

**Technique.** — The physiotherapist sits facing the knee, grasping it in such a way that her thumb lies at the central point of the medial aspect of the joint-line. Here the ligament can be clearly felt. Keeping her thumb on the affected part of the ligament, she imparts the friction by alternately flexing and extending the wrist. If the fingers are used as a fulcrum, the result is a to-and-fro movement of the thumb over the ligament.

In the flexed position the ligament lies at the posterior extreme of its range of movement; the massage serves to free the ligament and prepare for forcing of the knee-joint towards flexion. This is a necessary sequel to the massage; indeed, the friction should be regarded as the essential prelude to forcing towards flexion and rotation in each direction.

**Duration of Treatment.**—The physiotherapist should spend ten minutes on massage of the ligament in the extended position and another ten minutes on massage of the ligament in flexion. Forcing of movement (Plates 91 to 95) should immediately follow each of these massage periods. Exercises to maintain the added mobility and to strengthen the quadriceps end the session. More than a few weeks' treatment is seldom required.

**Results.**—*These are usually spectacular in long-standing* cases and rapidly obtained in cases of recent sprain. Massage to the site of the sprain followed by movement greatly diminishes the time required for full recovery after a recent sprain. In chronic strain, whether or not complicating osteo-arthritis, many months' disability may disappear after two to four weeks' treatment. Occasionally the adhesions about the ligament are so firm as to require rupture under general anæsthesia. If so, the after-treatment consists of the same deep friction to the ligament followed by forcing of movement and exercises.



PLATE 86

## PLATE 86

## CORONARY LIGAMENT OF KNEE

**Nature of Lesion.**—*This is always traumatic, and just as the meniscus is more often torn on the inner side of the knee, so is the medial coronary ligament more often overstretched than the lateral. The cause is a rotation sprain; medial rotation strains the outer coronary ligament, lateral rotation strains the inner.*

**Frequency.**—Common.

**Indication for Massage.**—Recent or chronic sprain. The presence of an effusion is no contra-indication to friction. Since the ligament that holds the meniscus attached to the tibial condyle is not kept adequately mobile by movements at the knee, sprains here recover very slowly. *If the ligament is adequately moved through a good range by means of the physiotherapist's finger, quick results are obtained.*

**Patient's Posture.**—The patient lies on the couch with his knee not quite fully flexed. *In full flexion, even if it is obtainable, the capsule of the knee-joint tautens to the extent of holding the physiotherapist's finger off the ligament.*

**Technique.**—The physiotherapist sits facing the patient's knee. She identifies the tibial condyle by coming down on it from above, and places her index finger on it. She reinforces with the middle finger. By pressing backwards and downwards, her index finger comes into contact with the affected coronary ligament. *Friction is now imparted by a to-and-fro movement of her forearm and hand.*

**Duration of Treatment.**—A quarter of an hour every other day is adequate. *After the friction the knee movements are forced—gently in recent sprains, firmly in chronic cases (see Plates 91 to 95).* Exercises follow.

**Results.**—*Uniformly good. This is one of the conditions in which a physiotherapist can most quickly prove to surgeons the value of friction; for patients treated in this way get well in as many weeks as they would otherwise take months.*

**Note.**—*The medial and lateral coronary ligaments are treated in exactly the same way.*

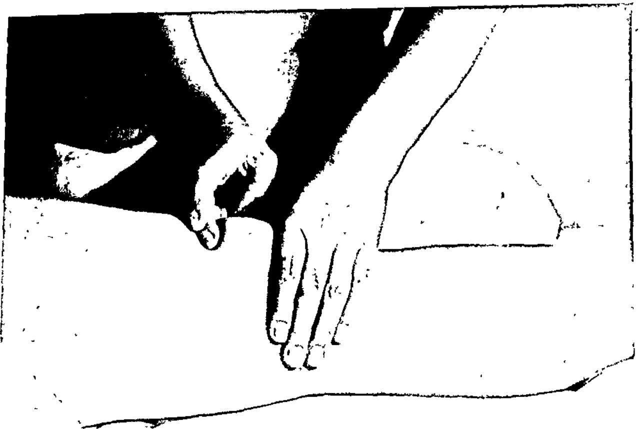


PLATE 87

## PLATE 87

### SUPRAPATELLAR TENDON

**Nature of Lesion.**—This is traumatic and is nearly always situated at the insertion of the tendon into the patella. It may be due to a sudden over-contraction of the quadriceps muscle or to direct injury. It may prove a puzzling condition, for though the knee is painful it may have a full and painless range of passive movement.

**Frequency.**—Uncommon.

**Indication for Massage.**—Tendinitis.

**Patient's Posture.**—The patient lies on the couch with the knee fully extended and the quadriceps muscle relaxed.

**Technique.**—The physiotherapist sits facing the patient's knee. She presses downwards on the lower pole of the patella with the web of her thumb, her fingers to one and her thumb to the other side of the knee. This steadies the patella and at the same time tilts the upper pole forwards, thus bringing it into a more accessible position. She places the middle finger of her other hand, reinforced by the index, against the upper pole of the patella. By pressing downwards and backwards she catches the tendinous fibres of insertion against the bone. The friction is imparted by a to-and-fro movement of her whole forearm and hand.

**Duration of Treatment.**—Twenty minutes two or three times a week. More than a month's treatment is seldom needed.

**Results.**—Uniformly good.

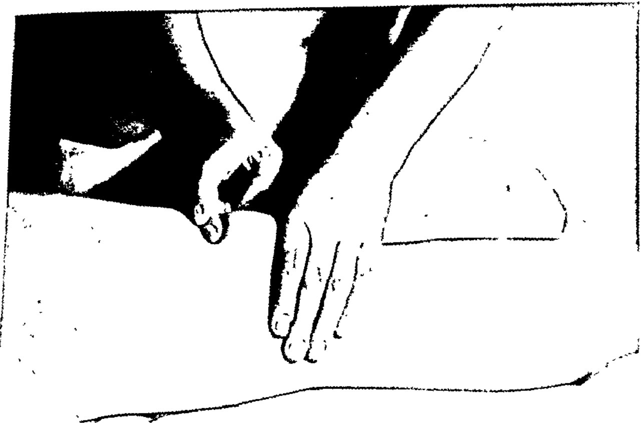


PLATE 87

## PLATE 88

## QUADRICEPS EXPANSION

**Nature of Lesion.**—This is usually traumatic, but cases of apparently spontaneous onset are encountered. The usual cause is sudden over-contraction of the quadriceps muscle; rarely a direct blow may injure the expansion. Either the inner or outer expansion may be affected, but the two lesions appear not to occur together. An overstretching of the inner expansion occurs in recurrent outward dislocation of the patella.

**Frequency.**—Uncommon. This is a puzzling lesion, for though the knee is painful it may have a full and painless range of passive movement.

**Patient's Posture.**—The patient lies with the knee extended and the quadriceps muscle fully relaxed.

**Technique.**—The physiotherapist sits facing the patient's knee. One hand grasps the leg in such a way as to push the patella well over towards the affected side. The middle finger of her other hand, reinforced by the index, is placed behind the now projecting edge of the patella. This finger, by pressing forwards, catches the expansion against the bone. The friction is imparted by a horizontal movement of the physiotherapist's forearm and hand.

The illustration shows massage given to the inner aspect of the expansion; at the outer side the physiotherapist uses her hands in a strictly analogous way.

**Duration of Treatment.**—Twenty minutes' friction suffices.

**Results.**—Recent sprains usually clear up after two or three sessions in the course of a week. In long-standing cases, two or three weeks' treatment may be required. Full lasting relief has always been attained in my experience.



PLATE 88

## PLATE 89

## INFRAPATELLAR TENDON

**Nature of Lesion.**—This is nearly always traumatic and due either to direct injury to the tendon or to an overstrain consequent upon sudden contraction of the quadriceps muscle. Recurrent sprain occurs.

**Frequency.**—This lesion is fairly common. Thickening and tenderness of the fat-pad beneath, and to either side of, the tendon should not be mistaken for a lesion of the tendon itself.

**Indication for Massage.**—Non-specific tendinitis.

**Patient's Posture.**—The patient lies with the knee fully extended and the quadriceps muscle relaxed.

**Technique.**—The physiotherapist sits by his knee and places her middle finger flat on his tendon. The index finger may be used to reinforce the pressure. The friction is given by a to-and-fro movement of the forearm while the finger lies against the tendon, pressing backwards.

Should the lesion lie at the origin of the tendon from the lower pole of the patella, the reverse position of that shown in Plate 87 should be adopted. In this way, by tilting the bone, access to its inferior aspect is secured ; an upward and backward pressure of the physiotherapist's finger is then required.

**Duration of Treatment.**—Twenty minutes suffices. Even long-standing lesions here usually clear up with friction given two or three times weekly for from two to six weeks. Recent injuries seldom need more than two or three weeks' treatment.

**Results.**—Permanent relief is the rule.



PLATE 89

## PLATE 89

### INFRAPATELLAR TENDON

**Nature of Lesion.**—This is nearly always traumatic and due either to direct injury to the tendon or to an overstrain consequent upon sudden contraction of the quadriceps muscle. Recurrent sprain occurs.

**Frequency.**—This lesion is fairly common. Thickening and tenderness of the fat-pad beneath, and to either side of, the tendon should not be mistaken for a lesion of the tendon itself.

**Indication for Massage.**—Non-specific tendinitis.

**Patient's Posture.**—The patient lies with the knee fully extended and the quadriceps muscle relaxed.

**Technique.**—The physiotherapist sits by his knee and places her middle finger flat on his tendon. The index finger may be used to reinforce the pressure. The friction is given by a to-and-fro movement of the forearm while the finger lies against the tendon, pressing backwards.

Should the lesion lie at the origin of the tendon from the lower pole of the patella, the reverse position of that shown in Plate 87 should be adopted. In this way, by tilting the bone, access to its inferior aspect is secured; an upward and backward pressure of the physiotherapist's finger is then required.

**Duration of Treatment.**—Twenty minutes suffices. Even long-standing lesions here usually clear up with friction given two or three times weekly for from two to six weeks. Recent injuries seldom need more than two or three weeks' treatment.

**Results.**—Permanent relief is the rule.

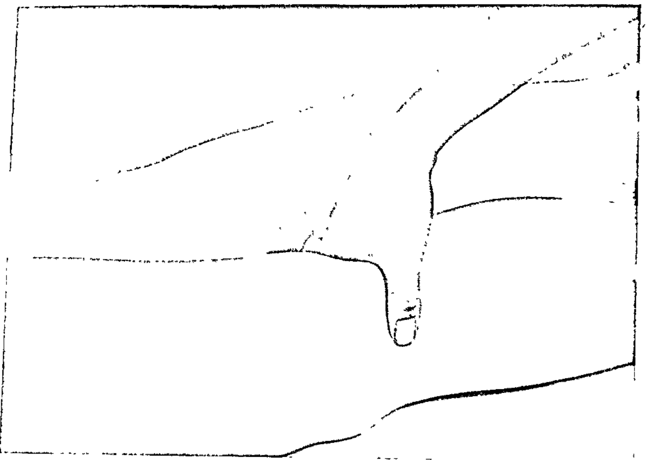


PLATE 90

## PLATE 90

## BICEPS TENDON AT KNEE

**Nature of Lesion.**—Tendinitis here is nearly always due to overuse, and may result from the prolonged maintenance of active flexion at the knee—*e.g.* in driving a car whose seat is too low or too close to the foot-controls. The lesion nearly always occurs at the fibres of insertion into the head of the fibula.

**Frequency.**—Uncommon.

**Indication for Massage.**—Non-specific tendinitis.

**Patient's Posture.**—It matters very little if the patient lies prone or supine so long as his knee is extended; the illustration shows him lying face downwards.

**Technique.** — The physiotherapist sits level with the patient's foot, facing his head. She can identify the head of the fibula most easily by coming up on to it from below. She then places her thumb on the tendon of the biceps muscle and grasps the patient's leg so that her fingers supply counter-pressure. By keeping her fingers still and giving small alternate pronation and supination movements to her forearm, she draws her thumb to and fro over the tendon.

**Duration of Treatment.**—Twenty minutes twice a week is adequate. Three to six weeks' treatment may be required.

**Results.**—Uniformly good.

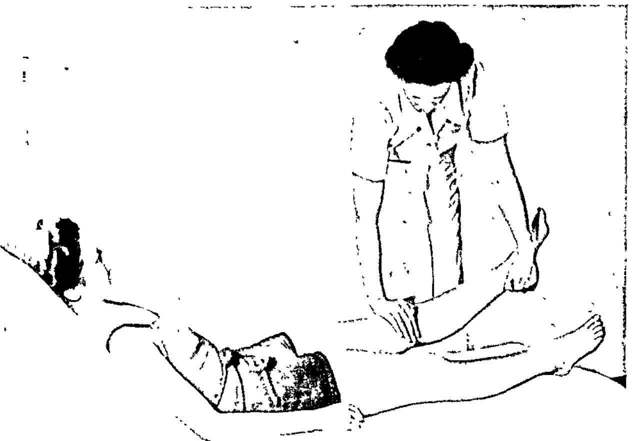


PLATE 91

## PLATE 91

## KNEE: FORCED EXTENSION

**Indications.**—Limitation of extension due to adhesions about ligament or capsule, or to osteo-arthritis. This movement may be cautiously attempted in chronic infective arthritis; and in gonococcal arthritis *after the activity of the infection has subsided.*

**Contra-Indications.**—Infective arthritis in the acute or sub-acute phase; gout; specific arthritis.

**Patient's Posture.**—The patient lies supine on the couch and extends the knee as much as he can.

**Technique.**—The physiotherapist stands by the patient's side level with his leg. She lifts his heel off the couch with one hand and presses down on his knee with her other palm. If adhesions are to be broken, the movement should be a quick jerk; if the capsule is to be stretched out, a slow movement is required. In recent trauma the forcing should be gradual and fairly gentle.

**After-Treatment.**—After the forcing, the patient repeats this movement actively at frequent intervals, so as to maintain the increase in range. Exercises, particularly those that strengthen the quadriceps muscle, follow.



PLATE 91

## PLATE 92

## KNEE: FORCED FLEXION I

**Indications.**—Limitation of flexion due to adhesions about a ligament or to capsular contracture. The detailed indications are exactly the same as those for forced extension, described in the text facing Plate 91.

**Contra-Indications.**—As for forced extension (see text facing Plate 91).

**Patient's Posture.**—The patient adopts the half-lying position on the couch. The back of the couch should not be tilted too high, since the patient's trunk then interferes with the achievement of considerable flexion at the hip joint.

**Technique.**—The physiotherapist stands level with the patient's thigh. She flexes his thigh at the hip as far as it will comfortably go; unless this is done she has very little control when flexion is forced at the knee. She places one hand at his knee, thus steadying it and maintaining flexion at the hip. She then places her other hand on his ankle and forces the patient's heel towards his thigh, slowly if the purpose is to stretch out the contracted capsule of the joint, quickly if it is to snap an adhesion.

**After-Treatment.**—As for forced extension (see text facing Plate 91).

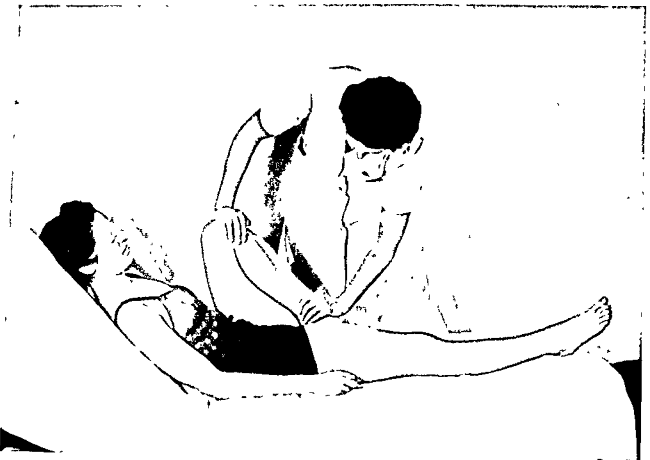


PLATE 92

## PLATE 92

## KNEE: FORCED FLEXION I

**Indications.**—Limitation of flexion due to adhesions about a ligament or to capsular contracture. The detailed indications are exactly the same as those for forced extension, described in the text facing Plate 91.

**Contra-Indications.**—As for forced extension (see text facing Plate 91).

**Patient's Posture.**—The patient adopts the half-lying position on the couch. The back of the couch should not be tilted too high, since the patient's trunk then interferes with the achievement of considerable flexion at the hip joint.

**Technique.**—The physiotherapist stands level with the patient's thigh. She flexes his thigh at the hip as far as it will comfortably go; unless this is done she has very little control when flexion is forced at the knee. She places one hand at his knee, thus steadying it and maintaining flexion at the hip. She then places her other hand on his ankle and forces the patient's heel towards his thigh, slowly if the purpose is to stretch out the contracted capsule of the joint, quickly if it is to snap an adhesion.

**After-Treatment.**—As for forced extension (see text facing Plate 91).



PLATE 93

## PLATE 93

## KNEE: FORCED FLEXION II

**Indication.**—If extension is full but only 45° of flexion range exists at the knee, and further flexion requires forcing, this method is indicated. It is sometimes required some weeks after an operation on the knee-joint, or in early cases of adherence of the quadriceps muscle to the shaft of the femur.

**Contra-indications.**—Fixation of the patella; old septic or gonorrhœal arthritis; active infective arthritis; gout.

**Patient's Posture.**—The patient lies prone on a high couch, and flexes her knee as much as she can.

**Technique.**—The manipulator stands facing the patient's knee and crooks his elbow about the front of her ankle; he presses with his other forearm against the back of her knee. He then clasps his hands. By maintaining this position of his forearms and tilting his body towards the patient's head, he keeps her knee on the couch while the knee-joint is forcibly flexed. Such great power is obtained in this way that care must be taken in the selection of suitable cases; otherwise the patella may be fractured or the tendon or muscle ruptured.

**After-treatment.**—A 20-lb. weight is attached by a rope passing over a pulley to the patient's leg by means of an ankle-strap. *The pull on the cord is horizontal and towards her head.* She is told to extend the knee actively and then to relax, letting the weight swing her leg back towards flexion at the knee. When the limitation of flexion has fallen to 45°, weight-bearing knee-flexion exercises restore the full range.



PLATE 93

## PLATE 94

## KNEE: FORCED LATERAL ROTATION

**Indications.**—As for forced extension (see text facing Plate 91).

**Contra-Indications.**—As for forced extension (see text facing Plate 91).

**Patient's Posture.**—The patient adopts the half-lying position on the couch, and flexes his thigh at the hip joint.

**Technique.**—Since the rotation range at the knee is at its greatest when the joint is well flexed, the physiotherapist must hold the hip and knee in considerable flexion by pressing one hand on the patient's knee. She then hooks the fingers of her other hand round the back and outer side of the patient's heel, applying her forearm to the inner border of his foot. The greatest pressure is taken by the distal part of the first metatarsal bone. She now forces lateral rotation of the leg—quickly or slowly according to the lesion present—by keeping her arm steady and flexing her elbow.

**After-Treatment.**—As for forced extension (see text facing Plate 91).

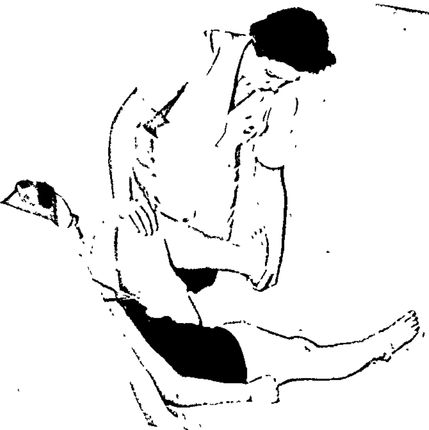


PLATE 94

## PLATE 95

## KNEE: FORCED MEDIAL ROTATION

**Indications.**—As for forced extension (see text facing Plate 91).

**Contra-Indications.**—As for forced extension (see text facing Plate 91).

**Patient's Posture.**—The patient adopts the half-lying position on the couch and flexes his thigh at the hip joint.

**Technique.**—The reverse of the method illustrated on Plate 94 cannot be used since it is so easy to sprain the patient's ankle in this way. Only the heel can safely be used as a lever when medial rotation of the leg is forced.

The physiotherapist stands at the patient's side level with his thigh. She clasps her hands tightly about his heel and holds the knee and hip flexed. By a combined movement of both wrists, she twists his heel strongly, thereby forcing medial rotation at the knee joint. As long as her hand on the outer side of his ankle does not exert pressure beyond the calcaneo-cuboid joint-line, the fibular collateral ligament of the ankle joint is safe.

Some physiotherapists find it easier to pass the forearm belonging to the hand which grasps the inner side of his heel in front of rather than behind the patient's leg.

**After-Treatment.**—As for forced extension (see text facing Plate 91).

NOTE

Lateral and antero-posterior mobility at the knee joint are undesirable movements that never require increasing. Thus it is no part of the mobilization of the knee joint to attempt to overstretch the collateral or cruciate ligaments.

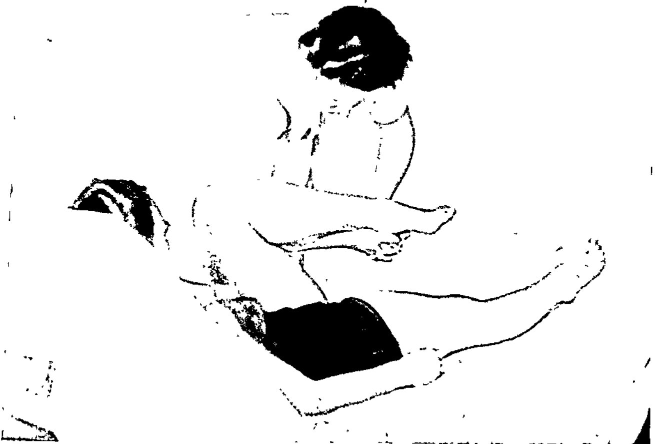


PLATE 95

## PLATE 96

## KNEE: REDUCTION OF SUBLUXATED MENISCUS

**Indication.**—Displacement of the loose portion of the intra-articular meniscus. The medial meniscus is far more often ruptured than the lateral; hence the manipulation illustrated is that for the former lesion.

**Anæsthesia.**—General anæsthesia is often required, especially on the first few occasions. An internal derangement, when it has occurred a number of times, can often be reduced without anæsthesia; sometimes the patient herself learns a trick movement that succeeds each time.

**Patient's Posture.**—The patient lies face upwards on the couch and flexes both hip and knee to a right angle. She relaxes her thigh muscles as best she can.

**Technique.**—The manipulator has, in the case of the medial meniscus, to move the cartilaginous fragment medially, since it lies displaced towards the centre of the joint. He must therefore apply strong valgus strain on the joint so as to open the inner aspect and encourage reduction in that direction. At the same time he must gradually extend the knee while rotating it to and fro rapidly. His one hand is therefore placed at the outer side of the knee and presses medially and towards the floor; the other hand at the foot rotates the leg and pulls it laterally, also holding it up so that the pressure of his first hand on the knee causes the joint to extend.

As the full range of extension is reached, reduction is signalled by a small click, whereupon extension at the knee is immediately felt to become free. The manipulation may have to be repeated several times before it succeeds.

When the lateral meniscus is at fault, the manipulator must apply varus strain to the knee-joint; hence his one hand must be placed at the inner side of the joint and his other hand at the ankle must press the leg medially (not illustrated). Otherwise the movement is the same.

Should skilled manipulation under anæsthesia f

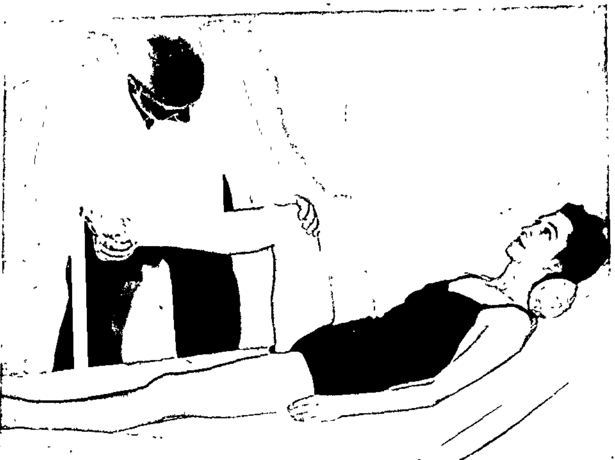


PLATE 96

reduction—a rarity—the whole meniscus should be removed at operation as soon as possible.

**After-treatment.**—If reduction is carried out shortly after a displacement that has already occurred a number of times, after-treatment may not be required. Otherwise it is as for sprain of the coronary ligament (see Plate 86) which, especially on the first occasion of the meniscal rupture, is painfully strained.

Recurrent attacks of internal derangement call for excision of the entire meniscus.

## PLATE 97

## KNEE: REDUCTION OF IMPACTED LOOSE BODY I

### FIRST MANIPULATION

**Indication.**—Displacement of a loose body with impaction between the joint surfaces. This accident is a great deal commoner than is supposed. Since the fragment is nearly always cartilaginous, it remains undetected on X-ray examination. Attacks of internal derangement with impaction occur as the result of fragmentation of articular cartilage in middle-*aged or elderly patients with a more or less pronounced degree* of osteo-arthritis at the joint. Therefore symptoms, even though of sudden onset, are as a rule mistakenly ascribed to the latter disorder. Osteochondritis dessicans in young patients, loose fragments with a bony nucleus and foreign bodies show up clearly on the X-ray plate.

The intention behind this manipulation is to move the loose body from its position between the articulating surfaces towards a neutral situation within the joint, *i.e.* posteriorly.

**Anæsthesia.**—If the method illustrated here is adopted, general anæsthesia is not usually required. It may be useful, however, in very apprehensive patients or when the manipulation has failed and vigorous repetition has been decided on.

**Patient's Posture.**—The patient lies prone on the couch and flexes her knee to a right-angle. An assistant holds her lower thigh down on to the couch.

**Technique.**—The manipulator stands level with the patient's knee, his one hand grasping the dorsum of her foot and the other her ankle. He pulls her leg strongly towards the ceiling at the same time rotating the leg medially and laterally to its full extent. The manipulator, rapidly rotating the leg during traction, moves backwards (towards the patient's feet), thereby slowly extending her knee-joint. There is no need to attempt full extension; moving the joint from 90 degrees to 30 short of full extension is usually sufficient. Both the assistant holding



PLATE 97

## PLATE 97

# KNEE: REDUCTION OF IMPACTED LOOSE BODY I

### FIRST MANIPULATION

**Indication.**—*Displacement of a loose body with impaction between the joint surfaces. This accident is a great deal commoner than is supposed. Since the fragment is nearly always cartilaginous, it remains undetected on X-ray examination. Attacks of internal derangement with impaction occur as the result of fragmentation of articular cartilage in middle aged or elderly patients with a more or less pronounced degree of osteo-arthritis at the joint. Therefore symptoms, even though of sudden onset, are as a rule mistakenly ascribed to the latter disorder. Osteochondritis dessicans in young patients, loose fragments with a bony nucleus and foreign bodies show up clearly on the X-ray plate.*

*The intention behind this manipulation is to move the loose body from its position between the articulating surfaces towards a neutral situation within the joint, i.e. posteriorly.*

**Anæsthesia.**—*If the method illustrated here is adopted, general anæsthesia is not usually required. It may be useful, however, in very apprehensive patients or when the manipulation has failed and vigorous repetition has been decided on.*

**Patient's Posture.**—*The patient lies prone on the couch and flexes her knee to a right-angle. An assistant holds her lower thigh down on to the couch.*

**Technique.**—*The manipulator stands level with the patient's knee, his one hand grasping the dorsum of her foot and the other her ankle. He pulls her leg strongly towards the ceiling at the same time rotating the leg medially and laterally to its full extent. The manipulator, rapidly rotating the leg during traction, moves backwards (towards the patient's feet), thereby slowly extending her knee-joint. There is no need to attempt full extension; moving the joint from 90 degrees to 30 short of full extension is usually sufficient. Both the assistant holding*



PLATE 97

the thigh and the patient herself feel the minor click that signifies reduction; the manipulator cannot feel it happen. After each trial of this method, which may require repetition a number of times, the patient gets up and walks about, testing the knee. If reduction has not been achieved after fifteen or twenty minutes' trial, the patient is asked to come again a day or two later for a renewed attempt. Sometimes two or three sessions prove necessary before the loose body has been moved to a position within the joint where it no longer gives rise to symptoms.

If this manipulation fails to reduce an impacted loose body, the manipulations illustrated in Plates 98 and 99 should be tried.

**After-treatment.**—The patient, if elderly, must be warned that he has a loose body inside the joint and that recurrence *is not unlikely within a year or two. He must therefore avoid* undue strains on his knee and come for treatment at once if the symptoms recur.

In young patients a cartilaginous loose body may sooner or later move within the joint to a palpable position. If so, it is pushed up thence into the uppermost part of the suprapatellar pouch, transfixed there with a needle, and removed forthwith through a small incision. Failing eventual arrival at a position where it can be felt, radiography, after the joint has been filled with air, may reveal the situation of the loose body, thus enabling the surgeon to explore the knee and remove it. Loose bodies with an osseous nucleus show up well on the radiograph; they are often multiple.

## PLATE 98

## KNEE: REDUCTION OF IMPACTED LOOSE BODY II

### SECOND MANIPULATION

**Indication.**—See text facing Plate 97.

**Patient's Posture.**—The patient adopts the half-lying position on the couch and co-operates actively. Since the physiotherapist's hands, when so placed as to exert pressure calculated to adduct the leg on the thigh (*i.e.* towards varus), are not suitably placed to force extension at the knee, this movement must be performed actively by the patient.

**Technique.**—The physiotherapist stands level with the patient's leg, which he bends to a right-angle voluntarily. She places one hand on the inner side of his knee, the other on the outer side of his ankle, and exerts strong varus pressure. Meanwhile, the patient actively extends his knee until full extension is reached. This manipulation may have to be repeated several times before the desired reduction takes place with an audible crack.

**After-treatment.**—The patient should sit cross-legged on the floor, the leg on the affected side in front of the other, and press strongly on the inner side of his knee, at the same time actively extending it. The floor exerts the counter-pressure at the ankle.



PLATE 98

## PLATE 99

## KNEE: REDUCTION OF IMPACTED LOOSE BODY III

### THIRD MANIPULATION

**Indication for Third Manipulation.**—If the manipulations depicted in Plates 97 and 98 have not restored a full and painless range of flexion to the knee-joint, this method of rocking the tibia on the femur during flexion should be employed.

**Patient's Posture.**—The patient lies face upwards on the couch, bending her knee as far as she can, and relaxing her thigh muscles.

**Technique.**—The manipulator inserts his wrist at the back of the patient's bent knee, so that it is squeezed between her femur and tibia. His other hand at her ankle alternately forces flexion and lets go, thus rocking the tibia to and fro on the femur. A click may be felt, flexion suddenly becoming free. This coincides with the return of the loose body from its position between the opposed articular surfaces to a harmless position at the back of the joint. Should this manipulation fail, it may be repeated during rotation. An assistant places her wrist at the back of the patient's knee; the manipulator, holding the patient's foot and ankle in both hands, simultaneously forces flexion and rotation (see Plate 99a).

**Caution.**—After each attempt at manipulation during flexion, the range of extension at the knee-joint should be tested. If, as the range of flexion gradually increases, that of extension is found to diminish, the manipulations towards flexion must cease; for the preservation of a full range of extension at the knee-joint is always paramount.

**After-treatment.**—The patient must be careful to avoid redisplacement of the loose fragment. This occurs most often when the knee is kept flexed for a long time; hence, he should not sit with the knee more bent than he can help nor should he kneel.

PLATE 99

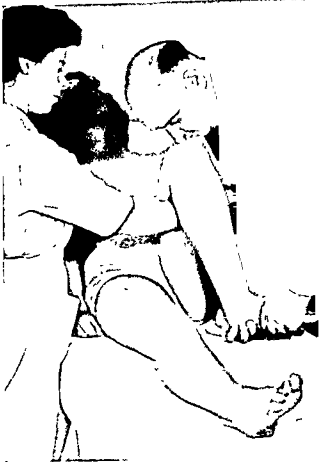


PLATE 99a

## PLATE 100

### GASTROCNEMIUS MUSCLE

**Nature of Lesion.**—Rupture of a few fibres of the gastrocnemius muscle so often occurs during a game of tennis that the condition is also known as "tennis-leg." The so-called rupture of the plantaris tendon has always proved in my experience to be caused by rupture of a few fibres in the gastrocnemius muscle.

**Frequency.**—Fairly common.

**Indication for Massage.**—Minor traumatic ruptures.

**Contra-indications.**—Ischæmic pain in the gastrocnemius muscle, *i.e.* intermittent claudication. Complete rupture.

**Patient's Posture.**—The patient lies face downwards on the couch, his foot resting in full equinus so as to relax the calf-muscles.

**Technique.**—The physiotherapist sits at the level of the patient's leg, facing towards it. She places two fingers, usually the middle and ring fingers, on the affected area of muscle. The transverse friction is imparted by the physiotherapist drawing her hand to and fro horizontally.

**Additional Treatment.**—The heel of the shoe must be raised enough to allow weight-bearing at once. During the first week after the occurrence of the tear, local anæsthesia should be induced at the inception of treatment and friction begun the next day. The patient, whether treated by massage or local anæsthesia, should practise a full plantiflexion and dorsiflexion exercise once an hour for the whole of his waking day.

**Duration of Treatment.**—Massage should be given for twenty minutes three times a week, followed by exercises first without, later on with, weight-bearing.

**Results.**—Patients seen the day after the injury, and treated by local anæsthesia, then massage, raising the heel and constantly repeated active off-weight exercises, may expect to be back on the courts in a week. In chronic cases full relief is nearly always attained by friction and exercises in four to eight weeks.



PLATE 100

## PLATE 101

### PERONEAL TENDONS: UPPER PART

**Nature of Lesion.**—Teno-vaginitis here usually follows a varus sprain of the tarsus, but may appear as an overuse phenomenon as the result, for example, of unaccustomed exercise on uneven ground.

**Frequency.**—Fairly common.

**Indication for Massage.** — Non-specific teno-vaginitis, whether recent or chronic.

**Contra-indications.**—Mucocele of the tendons. Rheumatoid teno-vaginitis.

**Patient's Posture.**—The patient lies with his lower limb held medially rotated so that its lateral surface lies uppermost.

**Technique.**—The physiotherapist sits facing the foot, which she holds in inversion so as to stretch the tendons. She places the tips of two or three fingers, held slightly flexed, on the tendons, thereby pressing these against the shaft of the fibula. The friction is imparted by a to-and-fro movement of the forearm, which makes her fingers ride over the tendons.

**Duration of Treatment.**—Twenty to thirty minutes' friction is usually required, since a stretch of two or three inches of tendon may have to be treated. The duration of treatment is very variable; two weeks to two months of massage given two or three times a week may be needed. The patient should avoid such exercise as results in pain until he is well.

**Results.**—Teno-vaginitis at this site, though it does not always respond at once to massage, follows the general rule that massage is the treatment of choice in teno-vaginitis. I have not yet met an intractable case.

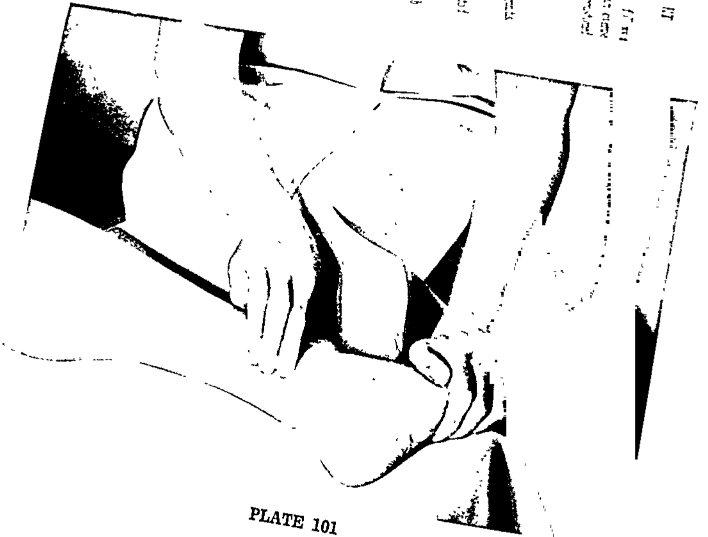


PLATE 101

## PLATE 102

### PERONEAL TENDONS: LOWER PART

**Nature of Lesion.**—Teno-vaginitis here usually follows a varus sprain of the ankle, but may be caused by overuse.

**Frequency.**—Fairly common.

**Indication for Massage.**—Non-specific teno-vaginitis, acute or chronic.

**Contra-indications.**—See text facing Plate 101.

**Patient's Posture.**—The patient lies with his lower limb held medially rotated so that the outer edge of his foot faces upwards.

**Technique.**—The physiotherapist sits facing the patient's foot, holding it in inversion and adduction so as to stretch the tendons. She does not dorsiflex the foot as well, since the tendons are more accessible to palpation with the foot held in some degree of plantiflexion. The tendons are identified in their course along the outer border of the calcaneus, and the physiotherapist puts two finger-tips on them. She gives the friction by moving her forearm to and fro, so that her fingers slide over the tendons.

**Duration of Treatment.**—Two to eight weeks' treatment twice weekly may be required. The patient should not walk farther than strictly necessary until he is well.

**Results.**—In my experience, no case has failed to yield to treatment by deep friction, though a few long-standing cases have taken several months to clear up.

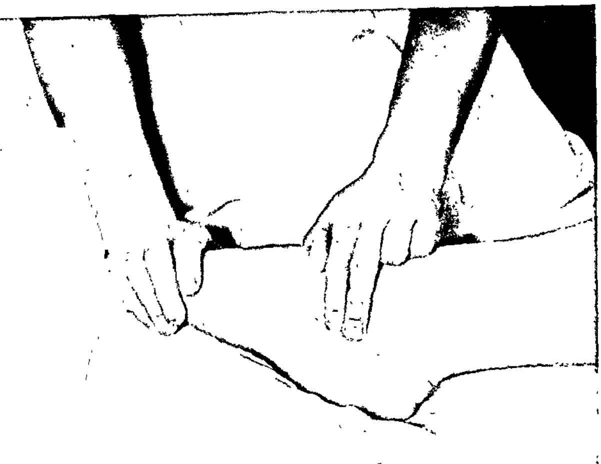


PLATE 102

## PLATE 102

### PERONEAL TENDONS: LOWER PART

**Nature of Lesion.**—Teno-vaginitis here usually follows a varus sprain of the ankle, but may be caused by overuse.

**Frequency.**—Fairly common.

**Indication for Massage.**—Non-specific teno-vaginitis, acute or chronic.

**Contra-indications.**—See text facing Plate 101.

**Patient's Posture.**—The patient lies with his lower limb held medially rotated so that the outer edge of his foot faces upwards.

**Technique.**—The physiotherapist sits facing the patient's foot, holding it in inversion and adduction so as to stretch the tendons. She does not dorsiflex the foot as well, since the tendons are more accessible to palpation with the foot held in some degree of plantiflexion. The tendons are identified in their course along the outer border of the calcaneus, and the physiotherapist puts two finger-tips on them. She gives the friction by moving her forearm to and fro, so that her fingers slide over the tendons.

**Duration of Treatment.**—Two to eight weeks' treatment twice weekly may be required. The patient should not walk farther than strictly necessary until he is well.

**Results.**—*In my experience, no case has failed to yield to* treatment by deep friction, though a few long-standing cases have taken several months to clear up.

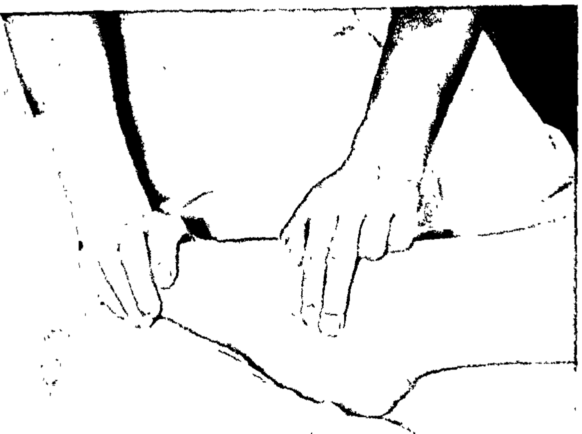


PLATE 102

## PLATE 103

### POSTERIOR TIBIAL TENDON: UPPER PART

**Nature of Lesion.**—Teno-vaginitis here is usually due to overuse, whether the result of unaccustomed exercise or secondary to a pes planus deformity. Standing with the heel held in valgus and the forefoot abducted puts an excessive strain on the posterior tibial muscle.

**Frequency.**—Fairly common.

**Indication for Massage.**—Non-specific teno-vaginitis.

**Contra-indications.**—See text facing Plate 101.

**Patient's Posture.**—The patient lies on the couch with his leg held laterally rotated so that its inner surface faces upwards.

**Technique.**—The physiotherapist sits by the patient's foot, facing it. She holds his leg laterally rotated and his foot at about a right-angle by grasping the inner side of his forefoot. She lays her middle finger, reinforced by the index, flat on the affected length of tendon in the sulcus between the tendo Achillis and the tibia. She imparts the friction by rotating her forearm, and the operative finger with it, by alternating full pronation and full supination movements. Unless this technique is used, her finger slides from the tibia to the tendo Achillis, missing the posterior tibial tendon altogether.

**Duration of Treatment.**—Recent cases usually clear up with twenty minutes' treatment twice a week for a month or less. Long-standing teno-vaginitis has required treatment for two or three months. When the tendon-strain is secondary to deformity of the foot, this may also require treatment. The patient, until well, should not walk more than necessary.

**Results.**—Full relief is always attained.



PLATE 103

## PLATE 104

## POSTERIOR TIBIAL TENDON: LOWER PART

**Nature of Lesion.**—Teno-vaginitis here is usually due to overuse, whether the result of unaccustomed exercise or secondary to a pes planus deformity.

**Frequency.**—Uncommon.

**Indication for Massage.**—Non-specific teno-vaginitis.

**Contra-indications.**—See text facing Plate 101.

**Patient's Posture.**—The patient lies on the couch with his leg laterally rotated so that the inner border of the foot faces upwards.

**Technique.**—The physiotherapist sits by the side of the patient's leg. She holds his foot at right-angles and the leg in lateral rotation by grasping the inner side of his forefoot. She places the tips of her index and middle fingers on the affected length of tendon and imparts the friction by a to-and-fro movement of her forearm. She feels her fingers ride over the tendon at each stroke.

**Duration of Treatment.**—Twenty minutes twice a week for a month is usually enough. The patient should not walk more than he need until he is well. In cases secondary to deformity of the foot, this may also require correction.

**Results.**—Uniformly good.

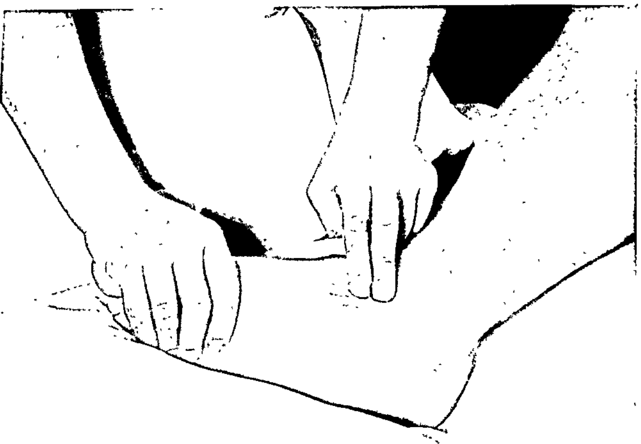


PLATE 104

## PLATES 105a and b

## TENDO ACHILLIS

**Nature of Lesion.**—This is usually the result of overuse, especially when heel-less shoes are worn by those accustomed to a heel. Sometimes a single severe dorsiflexion strain of the foot may set up teno-vaginitis here. The site of the lesion is usually at mid-tendon (*a*), but occasionally lies at the insertion into the calcaneus (*b*).

**Frequency.**—Fairly common.

**Indications for Massage.**—Non-specific teno-vaginitis. Residual disability after non-operative treatment for complete rupture of tendo Achillis.

**Contra-indications.**—Multiple xanthomata, gonorrhœal or gouty teno-vaginitis.

**Patient's Posture.**—The patient lies face downwards on the couch, his foot projecting just beyond it.

**Techniques.**—(*a*) The physiotherapist sits at his foot and puts her knee against the patient's sole, thus maintaining dorsiflexion to a right-angle. She grasps the tendon between her fingers and thumb. She imparts the friction by drawing her hand backwards until her digits slip from the sides to the posterior aspect of the tendon.

(*b*) The patient's foot is held in full plantiflexion, so as to relax the tendon. The physiotherapist presses forwards and downwards, indenting the tendon, until the tip of her long finger, reinforced by the index, lies on the upper surface of the calcaneus at the tendinous insertion. She draws her finger across this area by moving her forearm to and fro.

**Duration of Treatment.**—(*a*) A quarter of an hour's friction every other day for a week or two is usually required. Until well, the patient should not walk farther than necessary. (*b*) Treatment twice a week for a total of six to eight sessions will suffice.



PLATE 105a

**Results.**—Half the patients are well after a week of such friction. Nearly all the others are well in two to four weeks, whether the lesion is at the tendon or the teno-periosteal junction. If the patient is not well at the end of a month he should be referred back to his doctor, who may institute immobilization in a plaster cast or consider slitting up the tendon-sheath.

### COMPLETE RUPTURE

Complete rupture of the tendo Achillis must be treated by immediate operative suture; otherwise some lasting disability always remains. If a patient is seen too late for operation, several months' deep massage to the thickened tendon, and to the swollen areas to either side of it anteriorly, markedly diminishes the symptoms. Cure is not attainable.

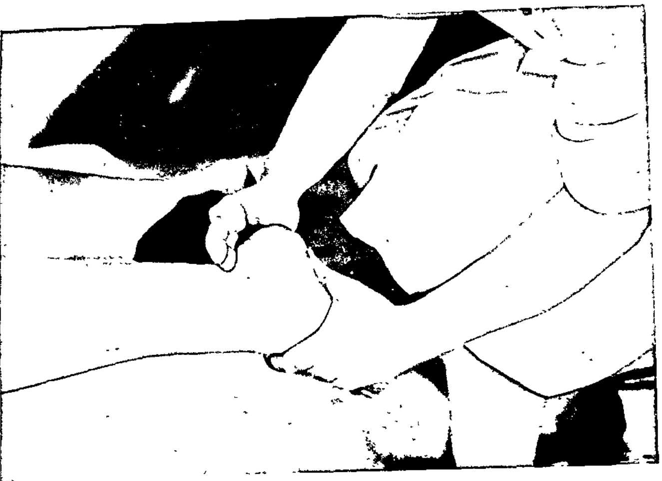


PLATE 105b

## PLATE 106

### SPRAINED ANKLE: (1) FIBULAR COLLATERAL LIGAMENT

**Nature of Lesion.**—This is always traumatic and the commonest result of a "sprained ankle." The usual place for some fibres of the ligament to part is at their origin from the fibula, but the tear may occur at the fibres overlying the talus.

**Frequency.**—Very common indeed.

**Indication for Massage.**—Traumatic lesions, recent or chronic, of the ligament, except those seen during the first twenty-four hours after the injury. For these, local anæsthesia is the treatment of choice.

**Patient's Posture.**—The patient lies on the couch with his limb medially rotated so that the outer border of the foot faces upwards.

**Technique.**—The physiotherapist sits at the medial aspect of the patient's foot. She stretches the ligament by holding the foot in as much inversion and plantiflexion as is possible. She places her middle finger, reinforced by the index, on the site of the lesion. If this lies at the fibular origin, her forearm is fully pronated so that her finger presses upwards as well as inwards; if it lies at the talar extent of the ligament, her pressure is directed medially only (not illustrated). She imparts the friction by drawing her hand and forearm to and fro.

If the sprain is recent, the friction is not vigorous, being only deep enough adequately to move the ligament on the subjacent bone. It is preceded by effleurage to diminish the œdema, and followed by passive, then active, movements. Finally, the patient is taught how to walk with a heel-and-toe gait without limping. However recent the sprain, all patients except the most elderly leave the Department walking.

If the sprain is of long-standing, the friction is followed by forced movement calculated to rupture abnormally adherent scar-tissue (see Plate 108).



PLATE 106

**Duration of Treatment.**—The patient should be treated daily in recent sprains, and in such cases a few minutes' deepish friction is ample. More than some weeks' attendance is seldom needed.

In chronic cases friction followed by mobilization should not be necessary for more than two or three weeks.

**Results.**—In recent cases, uniformly good ; in chronic cases, nearly always good. If a long-standing sprain here has not recovered at the end of three weeks, the patient should be referred back to his doctor, who may mobilize under anæsthesia.

### DELTOID LIGAMENT OF ANKLE JOINT

*The treatment is strictly analogous. However, the fact that* the sprain has occurred in the unusual direction should lead to examination of the whole foot. A marked valgus deformity may be detected, for which treatment designed to take excessive strain off the inner side of the ankle is required.

## PLATE 107

## SPRAINED ANKLE: (2) CALCANEO-CUBOID JOINT

**Nature of Lesion.**—This is always traumatic. The medial rotation and adduction force exerted when the ankle is sprained tears some fibres of the outer side of the calcaneo-cuboid joint capsule.

**Frequency.**—Very common. In more than half of all cases of " sprained ankle," the calcaneo-cuboid joint is also affected.

**Indication for Massage.**—Traumatic lesions, recent or chronic.

**Contra-Indications.**—Non-traumatic arthritis—*e.g.* infective or rheumatoid arthritis, gout or spasmodic pes planus.

**Patient's Posture.**—The patient lies with his lower limb extended and medially rotated so that the outer border of the foot faces upwards.

**Technique.** — The physiotherapist sits facing the foot, approaching it from the medial aspect. She steadies the fore-foot with one hand and holds it adducted, thereby bringing the calcaneo-cuboid joint into prominence. She lays the middle finger of the other hand, reinforced by the index, on the joint line. Friction is given by a vertical movement of her finger, imparted by moving the whole forearm.

**Duration of Treatment.**—In recent sprains, a few weeks' treatment suffices. The massage is followed by gentle movements and instruction in gait. In chronic sprain, this friction followed by fractional mobilization (see Plate 109) of the joint, continued until movement is full, usually brings about recovery in two to four weeks.

**Results.**—Uniformly good in recent or long-standing cases. Should a case of traumatic origin prove resistant, the patient should be referred back to his doctor so that mobilization under general anæsthesia may be considered.



PLATE 107

## PLATE 108

## TALO-CALCANEAN JOINT: MOBILIZATION

**Indication.**—Limitation of movement at this joint due to capsular adhesions. This is a common result of the immobilization of the foot in a plaster cast, *e.g.* in the treatment of many fractures of the lower leg. Occasionally, adhesions remain here after a " sprained ankle."

**Contra-Indications.**—Osteo-arthritis following fracture of the articular surface of the calcaneus, since any relief obtained is transitory. Another contra-indication is subacute arthritis at this joint—*e.g.* spasmodic pes planus, infective arthritis, gout or the type occasionally caused by trauma.

**Patient's Posture.**—The patient lies face upwards on the couch.

**Technique.**—It is very difficult to obtain any leverage at this joint, whether manually or with a Thomas's wrench. The physiotherapist sits at the patient's foot and clasps her fingers behind his heel, compressing the calcaneus as strongly as she can with each palm. By swinging one elbow away from and the other towards herself, she imparts a varus or valgus movement to the talo-calcanean joint. This forcing must be repeated with the utmost vigour a great many times at each session.

**Results.**—If only half the normal range can be restored the patient may lose all the symptoms arising at this joint. Months of treatment are usually required.



PLATE 108

## PLATE 109

## SPRAINED ANKLE: MOBILIZATION

**Indication.**—Adhesions remaining after a varus sprain of the tarsal joints.

**Contra-Indications.**—If a varus sprain has resulted in a peroneal teno-vaginitis, no advantage accrues from mobilization (see Plates 101 and 102). Forced movement is of course unsuited to the treatment of a recent sprain or of subacute arthritis.

**Patient's Posture.**—The patient lies supine on the couch.

**Technique.**—The physiotherapist sits at the patient's foot, facing him. She grasps the back of his heel with one hand. She places the other palm-downwards on the dorsum of his forefoot, hooking her fingers round the shaft of the first metatarsal bone. With the hand at his heel she maintains the vertical position of the hind-foot that provides a firm basis for forcing the mid-tarsal range. She employs her other hand to (*a*) plantiflex the foot; (*b*) medially rotate the forefoot on the hind-foot; and (*c*) adduct the forefoot. This triple movement is carried out by pushing her hand towards the floor, with the greater pressure exerted by the heel of her hand on the outer border of the patient's foot. For the simultaneous forcing of adduction she uses her fingers on the inner side of his forefoot as a fulcrum and moves her elbow away from her side. Massage to the site of the scar (see Plates 106 and 107) should precede the forcing of movement.

This method ensures mobilization of the outer side of both the ankle and calcaneo-cuboid joints.

**After-Treatment.**—The patient repeats these movements actively several times a day, so as to maintain the added range of movement achieved passively. He must walk without a limp.

**Results.**—Uniformly good.

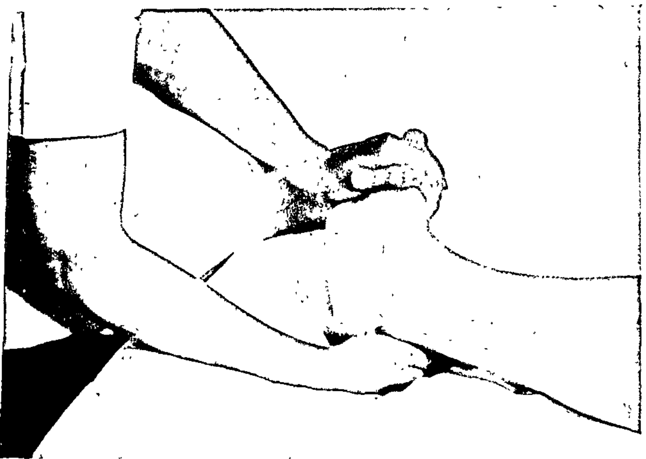


PLATE 109

## PLATE 110

## MID-TARSAL JOINT: MOBILIZATION OF LATERAL ROTATION

**Indications.**—Limitation of movement due to capsular adhesions, early osteo-arthritis, or the common congenital inversion deformity of the forefoot. Adhesions may form after a sprained ankle or in the course of the immobilization necessitated by the treatment of tibio-fibular fractures.

**Contra-Indications.**—Subacute arthritis (*e.g.* spasmodic pes planus), infective arthritis or gout.

**Patient's Posture.**—The patient lies face upwards on the couch.

**Technique.**—The physiotherapist sits at the patient's foot, facing him.

*In adults*, great strength is required to achieve an adequate movement. Thus the physiotherapist's hands should be clasped about the outer aspect of the forefoot. The heel of her dorsally placed hand presses chiefly on the first metatarsal bone; that of her other hand acts mostly against the plantar surface of the fifth metatarsal bone. The rotation is imparted to the forefoot by the physiotherapist swinging her elbows, one towards, the other away from, herself. This movement is repeated scores of times at each session, since an increase in the range is difficult to attain.

*In children*, even at the age of two or three, a surprising degree of vigour is necessary. If the physiotherapist's strength is adequate she can grasp the child's heel with one hand, her thenar eminence lying at the outer side of his heel, her fingers at the inner side. The fingers of her other hand are hooked about the outer side of his forefoot, her palm lying dorsally. By a simultaneous movement of both hands his heel is forced towards varus and the forefoot laterally rotated again and again (not illustrated).

### MOBILIZATION OF MEDIAL ROTATION

The treatment is strictly analogous. A congenital eversion deformity of the forefoot appears very rare.



PLATE 110

## PLATE 111

### DORSAL INTEROSSEOUS MUSCLE OF F

**Nature of Lesion.**—This may be traumatic, anc secondary to direct injury or to a marching fractur natively the cause may be overstrain, in which cas pain results.

**Frequency.**—Uncommon.

**Patient's Posture.**—The patient lies supine on the

**Technique.**—The physiotherapist sits facing the foot. With one hand she flexes the patient's tc to relax the muscle. She places the middle fing other hand, reinforced by the index, in the groove the two metacarpal bones. She imparts a transvers by rotating her finger by alternate pronation and si movements of her forearm.

**Duration of Treatment.**—Ten or fifteen minutes thrice weekly for two to four weeks usually suffice the massage, faradic and resisted flexor exercises to the toes.

**Results.**—Full relief is nearly always attained anæsthesia is occasionally curative at this site.

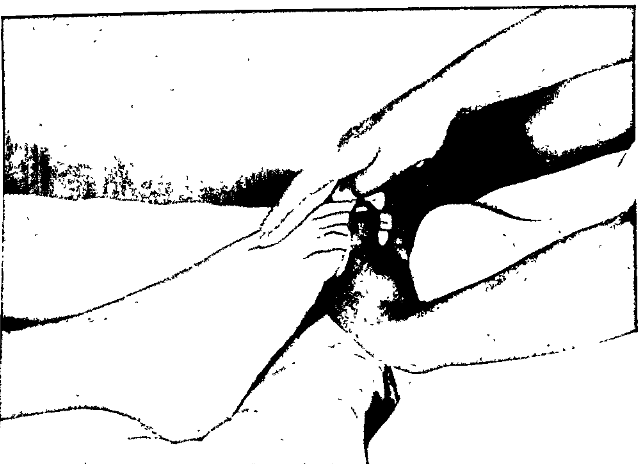


PLATE 111

## PART THREE

# TREATMENT OF VARICOSE ULCERS

By

AUDREY BARTHOLOMEW, Staff Physiotherapist
St. Thomas's Hospital

THIS section deals with deep massage and bandaging in the treatment of varicose ulcers, though other forms of physiotherapy (*e.g.* ultra-violet light and zinc ionization) can also be employed.

Dr. Bisgaard's method of treating varicose ulcers was demonstrated to us at St. Thomas's Hospital in September 1947 by Miss K. Dons. Since then we have based our treatment on his principles, using his type of specially-applied bandage, but have modified the massage according to a rationale more acceptable in this country.

## AIMS OF TREATMENT

1. To control the œdema.
2. To soften the indurated areas. These are found about the ulcer base, often extending well up the calf, particularly in the tissues on both sides of the tendo Achillis and in each calcaneo-malleolar area or "coulisse."
3. To re-educate the patient's gait. It is imperative that the elastic webbing bandage should be worn during walking.

## GENERAL TREATMENT

The patient should lie supine with the leg elevated and sufficiently supported to be fully relaxed (see Fig. 1).

(*a*) **Massage.**—This aims at relieving the stagnation of fluids in the leg. To this end centripetal stroking (see Fig. 2), followed by really deep kneading and picking-up movements are given to the thigh, then the calf. The patient, being in a

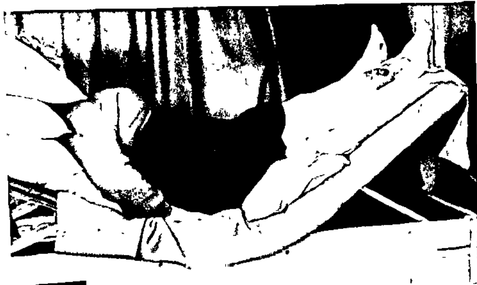


**FIGURE 1**—Correct Position of Patient

**FIGURE 2**—Deep Effleurage



**FIGURE 3**—Deep Stroking to the Instep

**FIGURE 4**—Deep Stroking to the " Coulisse "

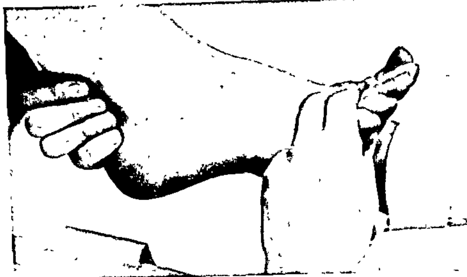


**FIGURE 5a**—Active Dorsiflexion against Resistance during Pressure

**FIGURE 5b**—Active Plantar-flexion against Resistance during Pressure

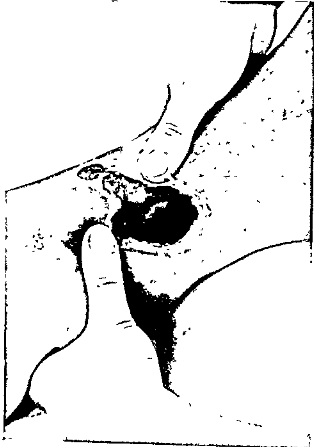


**FIGURE 6**—Frictions round the Ulcer Base



**FIGURE 7**—Movement to free Ulcer from the Periosteum

relaxed position, will allow gentle movements, which are gradually increased in depth until they cause considerable discomfort. It pays better to exercise a little patience and subtlety rather than at once to make a vigorous attack on the patient. Our treatment differs from the Danish method by our insistence that the thigh must be treated before the calf. Squeezing manipulations should be given to the calf and to the front of the ankle joint.

Dr. Bisgaard laid special emphasis on deep stroking movements to the sole of the foot, the instep (see Fig. 3), the medial and lateral "coulisse" (see Fig. 4) and to the Achilles tendon area. A grip should be taken of the tendo Achillis between the length of the thumb and flexed finger tips and the patient told to move his foot up and down several times (see Figs. 5a and 5b). The physiotherapist's fingers are then moved distally and the exercise repeated. This manœuvre is very effective in removing any residual swelling. The foot should be grasped between clasped hands and deep kneading should be given to the dorsum and sole of the foot.

(*b*) **Pressure.**—The elastic webbing bandage helps to maintain the depletion of fluids by exerting continuous pressure. In order that this pressure should be accentuated round the ankle and afford a pumping action during walking, extra pads of wool are placed behind the malleoli and about the lower leg (see Figs. 9 and 10).

## LOCAL TREATMENT

(*a*) **Massage.**—This consists of circular frictional movements carried out with the extended fingers or thumb; and these movements must be continued even though they cause considerable pain (see Fig. 6). As long as there are no eczematous patches or the skin is too like tissue-paper, friction should be applied in order to remove the cushion of indurated tissue that can usually be palpated beneath the ulcer. The friction should be repeated several times on one spot until the underlying tissues begin to soften. First the whole periphery of the indurated area should be treated piecemeal until, by working inwards, the friction comes to include the edge of the ulcer. Before putting on the gauze compress, an ointment of zinc oxide

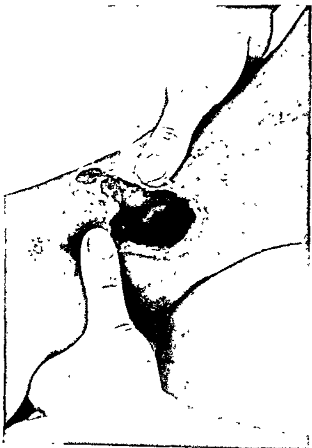


**FIGURE 6**—Frictions round the Ulcer Base



**FIGURE 7**—Movement to free Ulcer from the Periosteum

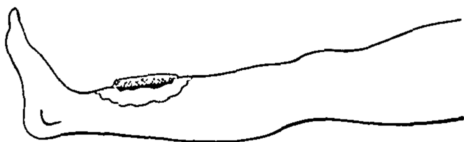


**FIGURE 8a**—Superficial Ulcer, with gauze compress $\frac{1}{4}$–$\frac{1}{2}$ inch thick, extending $\frac{1}{4}$–$\frac{1}{2}$ inch beyond its edge

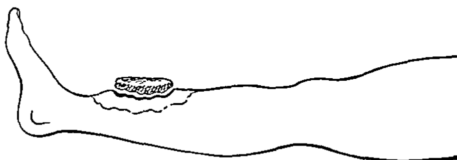


**FIGURE 8b**—Packing of deep ulcer with gauze to fit the base and thick enough to project above surface level

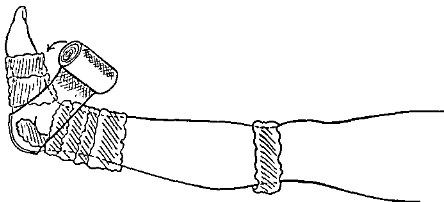


**FIGURE 9**—Plaster wool applied in order to obtain even pressure. *N.B.*—The pads applied behind the malleoli are held in place by a gauze bandage, which runs from the base of the toes to the patella

with 2 per cent. menthol may be applied with advantage round the edges to increase the rate of granulation. This ointment can be used also as a lubricant (more especially by the patient) to improve the condition of the skin. Another way to free the ulcer from the underlying induration and to increase the local blood supply is for the physiotherapist to place her thumbs on one side of the ulcer and her fingers on the other, and move it to and fro (see Fig. 7).

(*b*) **Pressure.**—Persistent local œdema is best diminished by applying a half-inch "sorbo" pad over the dressing of the ulcer, its size corresponding to the area of local œdema surrounding the ulcer; the pad should be maintained in place day and night. Such additional pressure also serves to combat the exuberant granulation which may develop when the ulcer is healing.

## EXERCISES

These are most important. Usually there is a considerable loss of active inversion and eversion of the foot. Ankle exercises are given, first with the leg elevated and the bandages off so that the patient can more readily understand what is expected of him; then with the bandages on, so that he has the added pressure about the ankle; finally during weight-bearing. The patient is encouraged to wear shoes and to walk without a limp.

The patient should attend a walking class; and yet more purposeful activity is secured if the exercises are repeated in the form of occupational therapy. The most valuable exercise for the ankle is some form of treadling.

All this treatment is useless without *the patient's co-operation*. He must be brought to realize that in the treatment of a varicose ulcer by this method the patient and physiotherapist share equal responsibility. The dressings and bandages must be applied before he gets up, and he must dress the leg again at night. (The webbing bandages are taken off at night.) The patient should be instructed to do some of the massage himself, especially the friction; this self-treatment, though not so effective as the physiotherapist's, is a great help. The bandage technique must be constantly supervised; for the result depends a good deal on its adequacy.

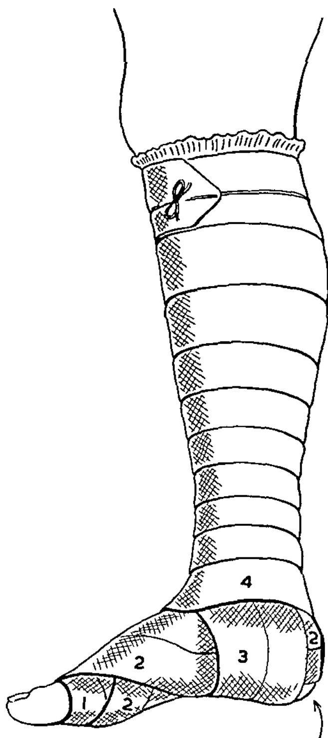



**FIGURE 10e**—" Bisgaard " bandage. Arrow shows area not necessarily covered by webbing bandage

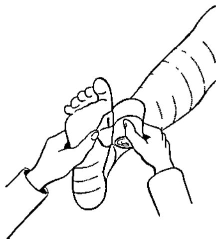



**FIGURE 10a** — "Bisgaard" bandage (11 feet of elastic webbing) over gauze bandage. Beginning of 1st turn

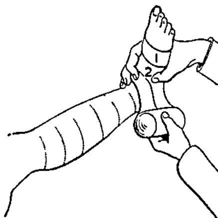



**FIGURE 10b** — "Bisgaard" bandage over gauze. Beginning of 2nd turn

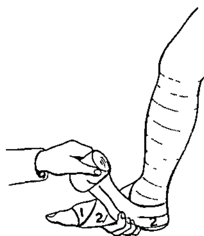



**FIGURE 10c** — "Bisgaard" bandage over gauze. End of 2nd turn; beginning of 3rd turn

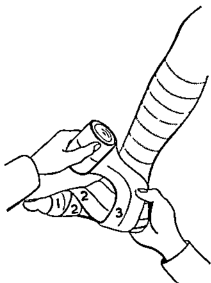



**FIGURE 10d** — "Bisgaard" bandage over gauze. End of 3rd turn

# INDEX

## DURATION OF TREATMENT

The complete treatment takes about forty-five minutes at each session, fifteen minutes each being set aside for general massage and local treatment, and fifteen minutes for instruction to the patient in applying the bandage.

Treatment should be given daily for the first week, and improvement is certainly more rapid if this can be maintained throughout. If the patient can co-operate intelligently the sessions may be reduced to three times a week, and then tapered to twice and then once a week.

## RESULTS

These vary with the age and weight of the patient, the type and position of the ulcer and how long it has been present. Naturally ulcers heal faster in young patients than in those older and less active. On an average, a medium-sized ulcer heals in six to eight weeks. A small ulcer may be cured in a fortnight. A large deep ulcer of, say, fifteen years' standing may take three or four months to clear up. But the discomfort will have cased after the first day's treatment, and the patient will admit to having slept better; after about ten days there is pain only when the leg is under treatment. An ulcer placed over a bony surface tends to adhere to the periosteum and final closure may be disappointingly delayed.

## MAINTENANCE OF HEALING

In order to prevent the recurrence of œdema and to keep the tissues soft, the patient should continue the massage at home. An elastic stocking, renewed when necessary, is worn during the day.